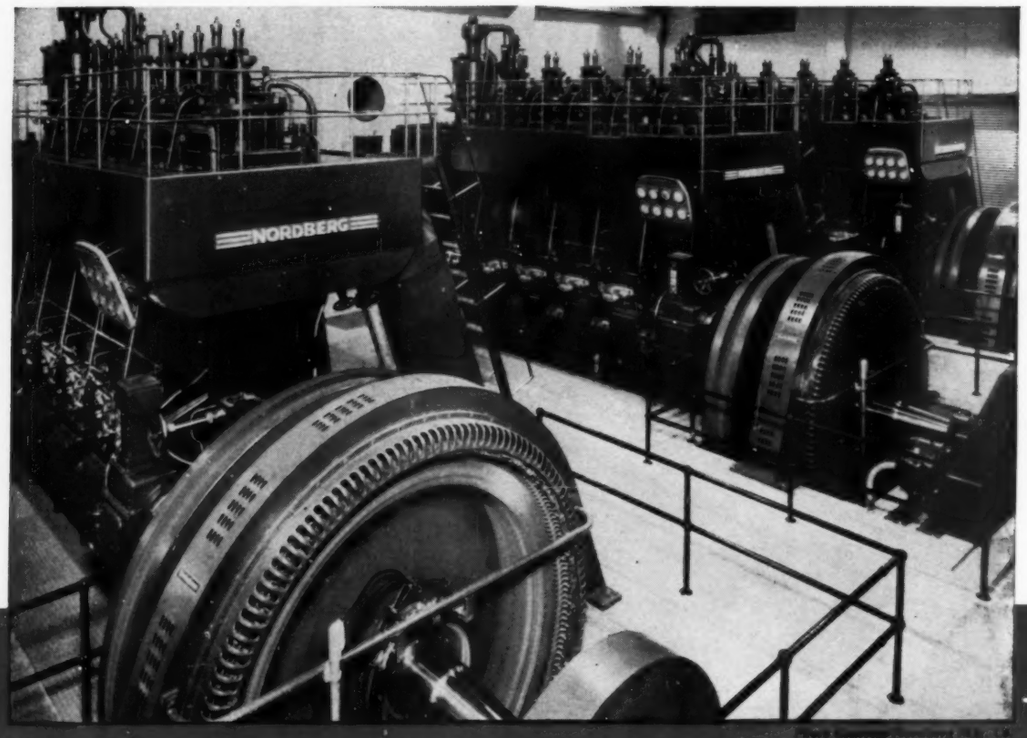
EL PROGRESS

FIVE DOLLARS PER YEAR

FEBRUARY · 1948

FIFTY CENTS PER COPY



ASSURE LOW COST POWER

Texaco Ursa Oils keep rings free for high efficiency, low fuel costs

When your Diesels are lubricated with *Texaco Ursa Oils*, you can count on—

1. *Low fuel bills* because *Ursa Oils* keep rings free for proper seal . . . avoid wasteful blow-by. You get full power from your fuel and burn less of it.
2. *Low Maintenance bills* because *Ursa Oils* assure freedom from sludge, varnish and carbon formations . . . prevent bearing corrosion . . . minimize wear. Your engines run longer between overhauls . . . parts replacements are fewer.

Texaco Ursa Oils are approved by all leading Diesel manufacturers and you can get them for every type, size and speed of engine. They are America's most famous Diesel lubricants, as shown by the fact that—

More stationary Diesel horsepower and more Diesel locomotives in the U. S. are lubricated with Texaco Ursa Oils than with any other brand.

Let a Texaco Lubrication Engineer help you run your Diesels more efficiently and economically. Just call the nearest of the more than 2500 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

FREE: "Diesel Operation" book—112 pages of valuable information. Explains simply and clearly the relation of fuel and lubricants to operating efficiency of Diesel engines. Write for your copy today.

TEXACO

REG. T. M.

TEXACO URSA OILS

FOR ALL DIESEL ENGINES

TUNE IN . . . TEXACO STAR THEATRE presents the TONY MARTIN show every Wednesday night. • METROPOLITAN OPERA broadcasts every Saturday afternoon.

DIESEL PROGRESS, for February, 1948. Volume XIV, Number 2. DIESEL PROGRESS is published monthly by Diesel Engines, Inc., 2 W. Forty-fifth St., New York 19, N. Y. Rex W. Wadman, President. Acceptance under the Act of June 5, 1934, at East Stroudsburg, Pa., authorized Mar. 27, 1940. Subscription rates: $5 per year, single copy 50c.

DIESEL and GAS ENGINE PROGRESS

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

CONTENTS

FEBRUARY 1948

FRONT COVER ILLUSTRATION: Busy scene in the Schenectady, N. Y., plant of the American Locomotive Company where 92% of production will be Diesel-electrics in 1948. The eight per cent steam locomotive production will be for export. Seen here are 2000 hp. Disel locomotive units (foreground) for passenger service and some 1500 hp. units for heavy duty freight service.

DIESEL PROGRESS for February, 1948, Vol. XIV, No. 2. Published monthly by Diesel Engines, Inc., 2 West 45th Street, New York 19, N. Y. Tel. MUrray-Hill 2-7333. Subscription rates are $5.00 for U.S.A. and possessions. All other countries $7.50 per year. Subscriptions may be paid the London office at £1-17s per year.

BUSINESS OFFICES

NEW YORK 19: Earle L. Townsend, 2 West 45th Street, MUrray Hill 2-7333

CHICAGO 1: Willard R. Cotton and G. H. Gannett, 307 N. Michigan Av., Franklin 2500

CLEVELAND 14: Frank J. Enright, Union Commerce Bldg., Main 5693

LONDON S. W. 1: E. H. Doddrell, 10 Bury Street, St. James's

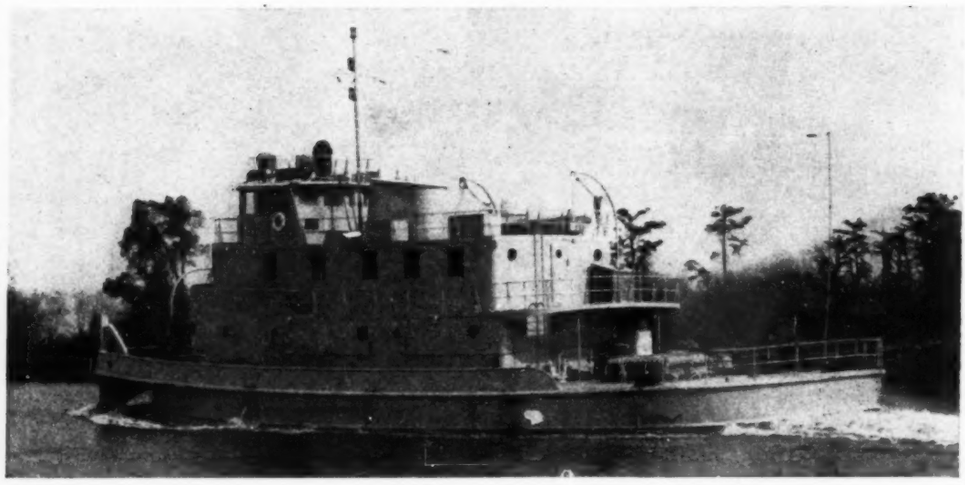
DETROIT 2: R. F. Pickrell, 314 Stephenson Bldg., Trinity 1-0790

TULSA 3: O. F. Cozier, 515 McBirney Bldg., 4-5555

LOS ANGELES 14: Walter S. Johnson, 412 West 6th Street, Mutual 1391

Pilot house view of towboat showing two sets of steering levers for steering and flanking rudders. Note Westinghouse engine controls.

Painted gray for ocean voyage to Argentina, 92-foot, 850 hp towboat built by Higgins, Inc., for Argentine government, slides downstream on trial.



Diesel Towboats for Argentine Waterways

South American Liner Transportation System Revamped Along U. S. Lines

By GEORGE D. CROSSLEY

THE United States is not the only nation alive to the importance of waterways transportation. Europe has long been dependent upon the Rhine, Danube and other rivers and canal systems for providing cheap transportation of slow-moving commodities; China is developing barge transportation in the Orient; and in South America, the Argentine Republic, urged by the enthusiasm of such far-sighted men as Juan Pistarini, General de Ejercito, S. R. (which means general of the army, retired service) is taking steps to build the country's prosperity by making more use of the rivers of Argentina.

There are three principal rivers, La Plata, Parana and Uruguay, and their total usable mileage is impressive. It has long been General Pistarini's idea to develop this type of transportation, no doubt from a sound military angle as well as for the improvement of Argentine economy; during the recent war, the United States waterways system of protected coastal canals plus dredged and controlled rivers was of major importance in the moving of petroleum products and many other defense materials and who can blame the Argentine for taking a leaf out of our book? Though it's anybody's book for that matter, for barge transportation was an old story in Cleopatra's day.

So the Argentine rivers are in for a course of concentrated channel improvement. Recently purchased by the Argentine government was one of the two big dredges just built by Avondale Marine Ways, New Orleans, La., for the McWilliams Dredging Company. (See October issue of DIESEL PROGRESS) This 195 ft. dredge, with a 6500 hp. steam turbine driving its main dredge pump and a 650 hp. Enterprise Diesel turning the generator, is being towed to its new home by tugs of the Argentine navy.

Much other marine equipment, boats of various sorts, also will go to the Southern republic; some bought "as is," others carefully planned for specific services. In the latter category are two interesting and powerful towboats built by Higgins, Inc., New Orleans, La.

Contracted for by the Argentine Ministry of Public Works, Administration General of Navigation and Ports, these boats are 92 ft. overall length, 89 ft. on the load water line, 28 ft. in beam and draw 6 ft. light and 7 ft. loaded. Specifications stipulated that the best of materials and labor be used to obtain A. B. S. highest classification for navigation of estuaries. Rights were reserved by the buyer to have Argentine government inspectors on the job throughout construction with full access to all departments.

Basic design and contract plans were made by A. M. Deering, naval architect, of Chicago; Higgins, Inc., supplied the working details. Work on both vessels was conducted concurrently and both were completed in approximately six months building time.

These boats are designed for efficiency in either pushing or pulling; pushing probably will predominate and heavy towing knees were built in forward.

Construction is steel, all-welded. Hull frames are inverted L's, 3½ in. by 2½ in. by 2½ in. by ¼ in., on 17½ in. centers, with gussets at each frame in way of chine and deck beams. There are four athwartship bulkheads, placed at frames 3, 9, 18 and 41, and are of ¼ in. 10.2 lb. plate reinforced vertically. Engine foundations are of ⅜ in. plate with 1 in. by 6 in. flat bar rider plate "continuously welded to girders, floors and as otherwise required." On the stout side, this construction.

Power is twin-screw, each boat having a pair of Atlas Imperial Diesels, model 6 HM-2124; of six cylinders, 13 in. bore by 16 in. stroke; developing 425 hp. at 325 rpm. The engines are true right and left, for inboard rotation, and are standard Atlas production. Injection is by the Atlas common-rail system. The pyrometer system is Alnor, with a thermocouple for each cylinder. Tachometer is Weston. Purolator lube and fuel filters are on each engine, with nothing extra in the way

of lube oil refiners. Instead of heat exchangers furnished by a separate manufacturer, these boats have a closed cooling system, skin cooler type, built into the hull, handling the cooling of the main Diesels, the water-cooled compressor and the auxiliary Diesels; an expansion tank, with sight glass and vent, is included in the system.

The Atlas details include the built-in Kingsbury thrust and Madison-Kipp lubricators. An important feature of the twin power plant is the installation of Westinghouse Air Brake controls, by which the engines may be started, controlled or stopped in the pilot-house. Manual control at the engines, of course, is also possible. The twin Atlas engines for both towboats were furnished by Arthur Duvic's Sons, New Orleans Atlas distributors, with installation and trial trip supervision by Duvic engineer Lew Jensen.

Auxiliary engines are 4-cylinder Cummins Diesels, turning 25 kw. generators. Five rudders are installed, two main and three flanking, with separate levers for each set in the pilot house.

Thorough testing of the vessels was a definite part of the contract; all engines and machines were tested individually for satisfactory performance; the hull, completely equipped with 10 tons of drinking water, 45 tons of fuel, 500 kilograms of lube oil, crew, provisions and full inventory of furniture and supplies, was tested for meeting maximum draft specifications of 7 ft.; speed navigation trials were made with the boats carrying this same load. During these tests of one vessel, at 200 rpm. of the engines the measured mile with the current was made in 7 minutes, 51 seconds; against, in 9:28.6, an average of 8 minutes, 39 seconds. At 250 rpm., downstream, 6:6; up, 7:34; average, 6.50. At 325 rpm., downstream, 5:50; up, 7:27; average, 6.26. At 300 rpm., full speed ahead, the boat was run through full stop to full speed astern, 300 rpm., in 23 seconds.

Aboard for all trials was Horacio W. Spitz, Engineer Inspector for the Argentine Government.

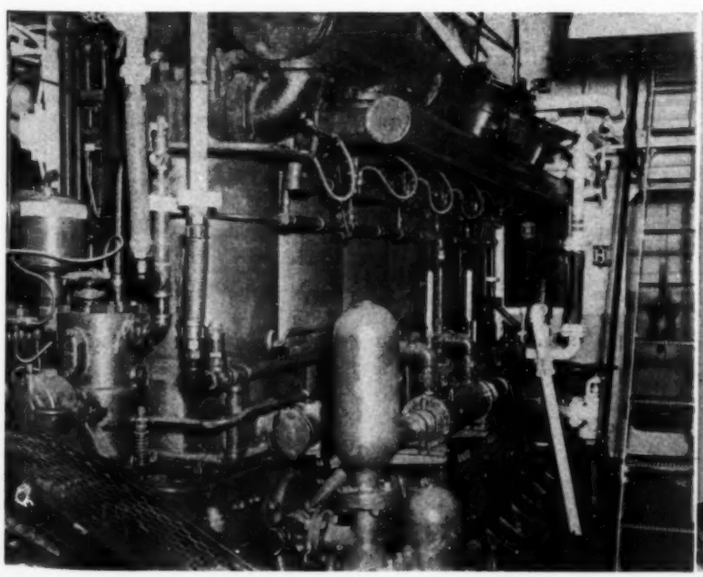
Besides speed tests, the boats were required to demonstrate their towing ability, and concerning this angle a little comedy could be written. Not about the boats, but about the difficulty in finding the material that could be towed. Specifications called for towing tests of pushing, in convoys consisting of one, two, three, four barges and so forth, completely loaded, to provide data on propulsion capacities, towing strengths, speeds, fuel consumption, steering ability during turning operations with or against tides, starting of the convoy and so on, and all this called for a string of loaded barges. And a string of loaded barges, which do not mind being delayed for a day or two while somebody borrows them for testing somebody else's boat, calls for some hunting as well as for genuine cooperation on the part of some tugboat owner. Suffice it to say that a complaisant tow was located and the tests conducted and the engineer inspector satisfied; though a few quiet headaches were involved before the tests could be conducted!

Delivering the boats to Buenos Aires also posed something of a problem. The contract called for the builder to deliver the boats, after which a final inspection was to be held; this inspection to cover machinery—dismantled for inspection—and complete hull inspection inside and out. Following this inspection, a preliminary navigation trial at Buenos Aires was specified for six continuous hours, followed by final tests with the same load as required for the New Orleans trials. Considering the rigor of the trials at the builder's premises, the long journey to Buenos Aires, and the final and tougher inspection there, you may judge whether or not the builder put together some boats which he was mighty sure would live through all and then be accepted.

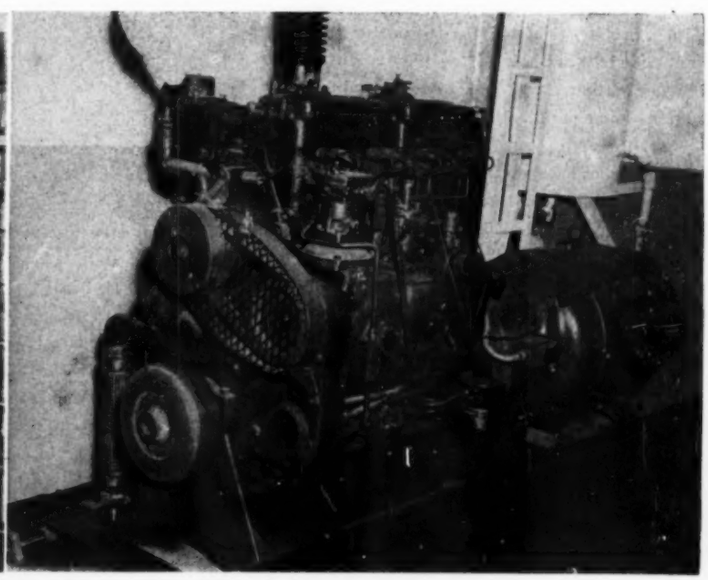
The first thought was to have the boats towed down; later, explains George O. Huet, chief of the Higgins engineering department, it was decided to deliver them under their own power. "Less strain on the hulls by driving them," he explains, "than by pulling them. And though these are primarily river boats, the hulls have more form and more draft than the conventional river towboats, they are adequately powered, the hurricane season is over and they should make it through in good shape."

The first of the two towboats left New Orleans on November 19, under command of Capt. Reinert E. Larsen, with Chief Engineer William B. Hoban in charge of the machinery. Carrying a crew of ten and a full load of fuel, water, lube and supplies, the boat had received a final going-over and every door could be made water-tight. The captain expected rough going, that his ship would have to dive through waves instead of riding over them if things got tough, but he was not worried. He too had given this towboat a minute inspection and was very sure he knew what he was doing. The whole trip would be close 7,000 miles, ould require around a month, with probably four stops for replenishing fuel and water although in an emergency a stop or two could be dispensed with entirely.

The second towboat trailed along a couple of days later; as this is written, reports of progress are satisfactory and before the reader sees this article, the probabilities are that the Higgins-built, Atlas-powered towboats will have completed their journey, passed their final tests, and will be pushing barges up the Parana or some other river.



Engine room view showing one of two 425 hp 325 rpm. Atlas Diesel Engines installed for main propulsion.

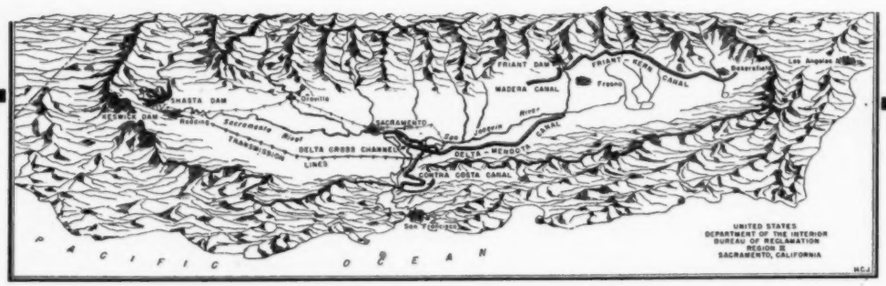


One of a pair of 25 kw. Cummins Diesel generating sets aboard towboat. These Diesels supply power for ships service.

DIESELS CARRY WATER TO THIRSTY LANDS

Irrigation Program in California's Central Valley Utilizes Diesels for Canal Building

By F. HAL HIGGINS



ALL over the West the call is for more water with the emphasis on the three Coastal states plus Arizona, where the population has been piling up in unrelenting waves since war brought high wages to shipyards and plane factories. In California the increase is highest and the call for water most vocal in volume. One begins to wonder if the new weather makers won't be brought in to make snow pile up on the Sierras to increase the summer run-off for crop irrigation before long.

To start this story, let us look at the facts of California's irrigated farming. Probably the best crystallization of the California irrigated farm facts was made by Prof. H. B. Walker, retiring head of the Agricultural Engineering division of the University of California, at his most recent Farm Machinery Conference at Davis, Calif.:

"We are in a great agricultural growth area—a more or less dynamic one, with California producing at the moment nearly one-half of the agricultural crop values of these 11 Western States and nearly one-twelfth of the crop values of the Nation. Likewise, California has within her borders approximately one-half of the population of the 11 Western States, and nearly one-sixteenth of the Nation's total population.

"Acre incomes have advanced sharply in this Western farm region compared with the rest of the Nation. For example, Clawson and Calhoun,[1] in their 'Longterm Outlook for Western Agriculture' states: 'When cash income (per acre) is adjusted to a constant price level and put on the basis of an acre of irrigated land equivalent; the result is a strongly upward trend. This is particularly marked in California where the average cash farm income per acre in the 1939-43 period was 104% of the 1910-14 period. In the other Western States the increase was 75%. By way of contrast, in the other 37 states of the Nation the increase was 46%.

"Agricultural production in this region has more than doubled since 1910, with the increase in California nearly twice as rapid as for the rest of the area. In the period 1939-43 the cash farm income in California was 83% of the other 10 states making up the Western farm group, nor has California or the other Western States reached the limit of irrigation development. The Bureau of Reclamation has submitted to Congress a development program for the irrigation of 6¾ million acres of new land plus supplemental supply of water to 9½ million acres as an estimate of maximum possible development within 10 to 12 years. This is, of course, higher than may be reasonably achieved in so short a time, but Clawson and Calhoun state in their 'Longterm Outlook for Western Agriculture,' 'considering all factors, it is estimated that irrigation of new land and provision of supplementary water supply will be equal in productivity to about 4 million acres of irrigated land by 1960.'"

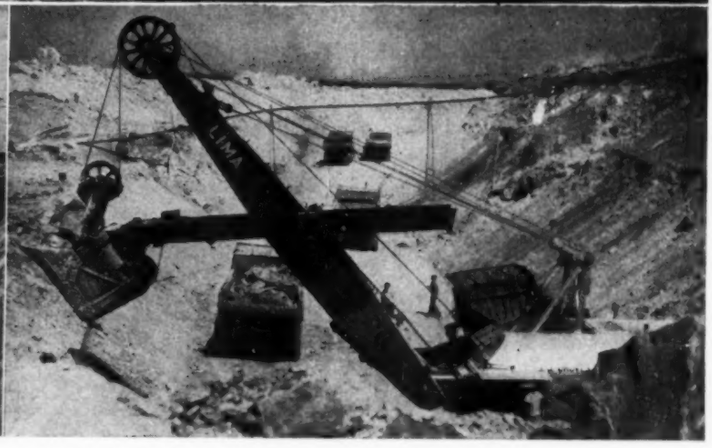
Congress has recently hastened to appropriate more money to keep the work of building the canals in the San Joaquin Valley that carry water from Shasta Dam, far up the Sacramento river to the north, to the Delta-Mendota Canal on the West Side of the San Joaquin Valley. The maps show the course of this canal and the one on the east side of the San Joaquin that taps Friant dam. The two canals are expected to restore a lot of marginal farm land where insufficient water is holding back food production, and to also add large aeras of virgin pasture and dry grain land to the irrigated lands that will increase and insure food production. This Delta-Mandota canal when completed will be a concrete-lined river carrying as much water as any river in that valley. It will handle water releases from Shasta dam, nearly 250 miles north. The largest pumping plant in the State, a $5,888,000 job now under construction, will lift the water at the rate of 4600 second feet 200 feet to get it into the canal as it is taken from the Sacramento river into which the Shasta dam empties its releases.

To give DIESEL PROGRESS readers an idea of the growing place of Diesels in heavy construction work where the leading contractors are battling competitors for the various jobs into which the canals have been cut up for speed and convenience, your Old Reporter picked up his camera and notebook, piled into his Oldsmobile (accent on OLD after 240,000 miles of driving all over the West to logging, ranching, mining, road building and construction jobs), and took two days to visit the contractors on the various sections of the two canals in the San Joaquin Valley.

Cooper-Bessemer 650 Hp. Swinging Big Bucket

The most spectacular Diesel job in action when the writer was out to the job was Morrison-Knudsen, Inc. and M. H. Hassler's Bucyrus-Erie Monigan powered by a 650 hp. Cooper-Bessemer 9 W Diesel engine. This big duck-footed monster was cutting the canal through the foothills and across roads when first seen. Morrison-Knudsen are one of the finest of the big western contrasting firms with important jobs and offices scattered over the map. Their choice of equipment indicated to the visitor who had seen their operations on such important jobs as the All-American Canal, Los Angeles Aqueduct, and Hoover Dam that the old Cooper-Bessemer firm had arrived in the heavy equipment field with their Diesel. "M-K" is a very sound long-pull business today. The old days of gambling on railroad and highway jobs is pretty well over, and the engineers of such firms know exactly what they are buying when they purchase

[1] *Clawson, M. and Calhoun, W.: Longterm Outlook for Western Agriculture. General Trends in Agricultural Land Use, Production and Demand. Bureau of Agricultural Economics and Bureau of Reclamation, June, 1946.*



Marion dragline at work near Patterson, California on the Delta-Mendota Canal. Dragline is powered by portable Diesel-electric generating set driven by G. M. Diesels.

(Top illustration) Cooper Bessemer 650 hp. Diesel drives this Bucyrus-Erie Monigan dragline cutting through hills near Tracy, California. Caterpillar tractor (right foreground) smooths path for dragline.

Diesel-engined shovel working in hard rock. Cummins engined trucks haul rock away. Lima shovel is owned by S. J. Groves.

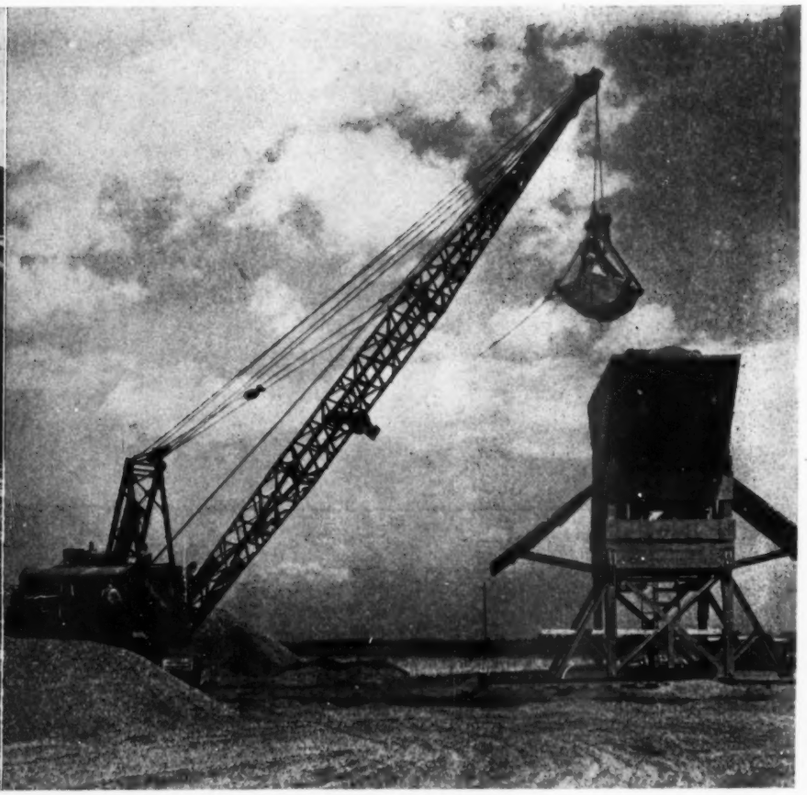
any piece of equipment. Of course, during war years, some firms took substitutes in the way of second choices when war jobs gave them profit margins that would allow more leeway. But the Cooper-Bessemer engine on this job was doing its stuff as it cut a gash through the hills with a Caterpillar D8 with LeTourneau bulldozer smoothing its path of progress ahead and sweeping up the bottom of the canal behind. This type of Diesel bulldozer work was seen all up and down the canals as standard practice by all the contractors, by the way. Operators of both dragline and tractor spoke highly of their machines.

Up the road some 20 miles, over back of Patterson, was seen H. H. Everist, Sr., equipment at work on another West Side section of the canal. The "new look" on this job was the Diesel-electric portable power plant powering of a 7200 Marion dragline by cable from a 50-ton air-tired trailer on which is carried the GM Diesel. It passes the power through a cable to the dragline 50 yards or more ahead. The ubiquitous Cat D8 with bulldozer on its nose is on the job to pull the Diesel ahead from time to time as the Marion dragline eats its way ahead to the end of its cable leash. Besides sweeping up the floor for a level finish behind the dragline, the Diesel tractor moves the two light towers ahead of the job for night work. These lights are powered by Caterpillar Diesel electric equipment, by the way. The light towers with Diesel electric power at the base are on sled runners for moving.

Besides this spectacular team of Diesel-electrics here, Everist also has a pair of Marions draglines with Cummins 275 hp. Diesels; also a Caterpillar D3100s, D8 tractors, etc. Operator Joe Baker on the GM Diesel that powers the Marion shovel spoke very highly of its efficiency to date. He thought as long as the weather behaved and no rain came to bog down the 50-ton job it would be O.K. It furnishes the dragline a smooth power that he thought might point to more of the same type of power on future jobs.

One Allis-Chalmers tractor powered by the GM Diesel engine, of course, was noted just above the Diesel electric-powered Marion. It was busy discing around the concrete lining machine on a

Caterpillar-Diesel-engined gandy dancer tamps walls of canal before concrete is applied. Arizona-Nevada Co. built this to do a costly hand labor job.



Clamshell bucket of aggregates being swung over batching plant on Delta-Mendota Canal near Patterson, Cal. Murphy Diesel installed on clamshell.

stretch of canal that was being completed. But a mile below the Marion at the aggregate batching plant was found a clamshell powered by a Murphy Diesel. The Murphy is a new one in this area on heavy construction, so it has a chance to show its qualities in the keenest post-war dog fight among Diesel engines the writer has encountered this side of the Missouri river. Cummins, GMC, Caterpillar, International, Cooper-Bessemer, Buda, Fairbanks-Morse—they are all out there battling for the favors of the big contractors who can't be fooled very often on equipment. They learn about it the hard way and with their bankrolls and reputations on the line.

Friant Dam Canal All-Diesel Equipment, Too!

Arizona-Nevada Co. has a couple of stretches of the Friant Canal over on the east side back of Fresno to skirt the foothills. A trio of Diesel-powered compressors were seen drilling for blasting in a stretch where hard rock was encountered. Two International Diesels powered a pair of Schramm compressors, while the Chicago Pneumatic carried a Caterpillar Diesel for its power plant. On the same job, just south of the compressors was a Link-Belt dragline with Caterpillar Diesel. The job was stopped as the operator did some clutch service. Over on a farm a quarter mile west of this canal job could be seen the Arizona-Nevada Co. shop where the equipment was repaired and serviced to keep it rolling. The writer drove over and studied it. In the center of activity was a big Diesel truck with low platform trailer for moving heavy equipment. The truck was merely getting a little service to keep it in top shape before the next job. The shop here is capable of handling any job of service, repair or overhaul on any piece of equipment on the job.

Near Danuba the same contractor has a P & H 1055 dragline powered with Buda Diesel that rates 190 hp. Also, here are two 165 hp. Bucyrus-Erie 44s which are also powered by Buda Diesels. Buda Diesels are suddenly appearing on the western front in both long-haul trucks and heavy construction equipment. A lot of nice comments from truck drivers who know their Diesels can be heard out on the highways. Here also is a Lima 120 with 236 hp. Cummins Diesel when turned up to 1100 rpm.

But the new machine that had the old hands talking to themselves was the Diesel-powered "Gandy-Dancer" that had been designed and built by Arizona-Nevada Co. for tamping the sloping walls just before the concrete was poured. Caterpillar Diesel had the power honor on this one. Another one of theirs on this spot was a Koehring dragline with Caterpillar Diesel. Their compressor here was powered by an International Diesel. But, here again the visitor saw a new one that marks the exit of the hand laborer with No. 2 shovel on western construction. It was a Cat D2 with Traxcavator front-lift scoop for cleaning up and loading into trucks on the bottom of the canal as finished. Not only was there this little Cat, but suddenly there loomed up a Cat D6 with the big size Traxcavator to fill a truck in a hurry. The uncanny skill of the operators of these front-lift tractors is something to ponder. They can cut a trench to a hair line, flip a shovel of dirt over the side of a truck without losing a crumb, and make themselves so useful at choring around they pay their way and earn their cost in a few weeks.

Morrison-Knudsen Co. and Hassler had a stretch of the Friant Canal well up toward the Friant dam. Here the writer caught a Northwest shovel powered by the second Murphy Diesel he had seen here. It was just noon with the operator climbing off for his lunch. Hence, not snapped in action. Operator Murray Jackson said it was doing O.K., however. Here also was the inevitable Cat D8 with bulldozer to clean up around the shovel.

Peter Kiewat Sons Co. have a pair of walking draglines, Fairbanks-Morse Diesel powered, over on this Friant Canal job. They rate 300 hp. Another walking dragline is a Marion 7200 also powered by a Fairbanks-Morse Diesel.

Having followed the big construction jobs of the West the past 15 years—All-American Canal, Los Angeles Aqueduct, Bonneville, Grand Coulee, Shasta and Friant dams, etc.—he noted this complete swing to Diesels. There wasn't a gas engine in sight as far as the construction equipment was concerned. The Diesel has moved in and taken over construction.

DEVELOPMENTS IN ENGINE COOLING SYSTEMS*

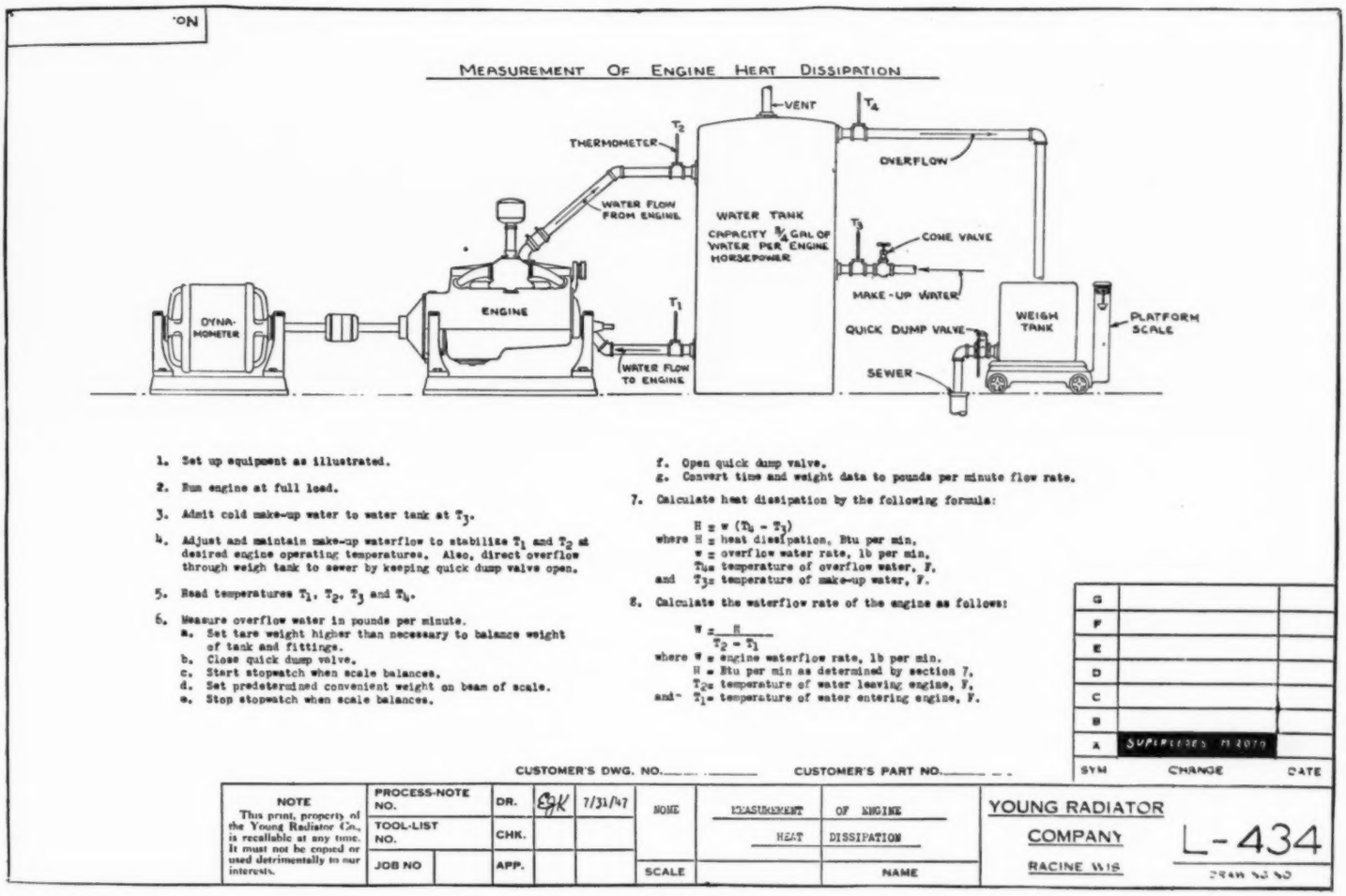


Fig. 1

By FRED M. YOUNG

THE subject of heat rejection to liquids (jacket water) for internal combustion engines is one that has not received the engineering attention required for developing efficient, properly proportioned cooling systems. Many engines manufactured today utilize heat rejection values based on handbook factors. Every make and model of engine will have a different heat rejection because of design types and differences and beyond this, heat rejection values will vary considerably on the same make and size of engines coming off a production line. It is therefore evident that heat rejection rates must be obtained from actual tests for given models and when used for cooling system calculations, should preferably be the average of test values obtained from several engines. Figure 1 shows a method of measuring engine heat dissipation and calculating the unit heat rejection rate. When exact data is not available a fairly reliable rule of thumb is that approximately 1/3 of the energy value of the fuel consumed per unit time is dissipated to the engine jacket.

In recent years heat rejection rates to the coolant on automotive type engines have been reduced as the efficiencies of the engines were increased. The same is true of large Diesel engines however the large gasoline engines and small Diesel engines remain at about the same level. This is illustrated by the following tabulation.

Automotive type gasoline engines—
40 Btu per min. per bhp.
Large industrial type gasoline engines—
60-65 Btu per min. per bhp.
Average Diesel engines—
50 Btu per min. per bhp.
Large Diesel engines—railroad type—
35 Btu per min. per bhp.

This indicates that eonsideration must be given to the cooling system when changing types of engines in a power plant setup. In general a Diesel engine may be substituted for a gasoline engine without a change of radiator, however it is

* *Paper delivered before meeting of S.A.E. at Salt Lake City, November, 1947.*

** *President, Young Radiator Company, Racine, Wisconsin.*

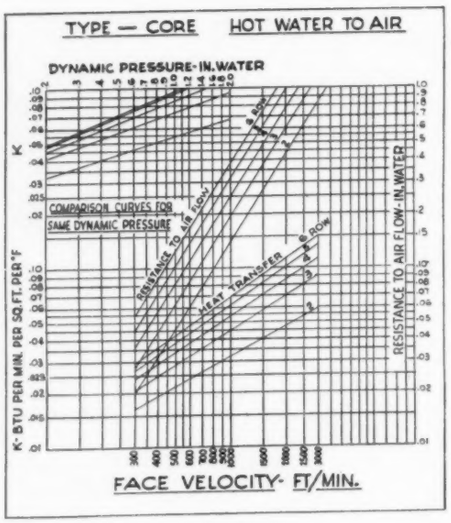


Fig. 2

usually necessary to increase the radiator size when a Diesel engine is replaced with a gasoline engine.

Other information essential to the selection of an engine cooling system is the rate of water flow and the "bottom" tank temperature of control temperature desired for any maximum ambient air temperature. The engine designer depending upon his school of thought, the type of engine and the type of service for which the engine is intended usually selects a water pump flow rate varying from ½ to 1 gallon per minute per bhp. A value of ¾ gallons per minute per bhp. is used in the average engine. The higher water circulation rates are usually found on trucks, buses and other heavy duty vehicles. These are better than average cooling installations and operate at about 8 F. temperature drop through the radiator in contrast to an average value of 10 F. Engines with lower circulation rates operate at about 15 F. temperature drop.

Airflow rates through a radiator core must usually be in the range of 1000 to 2000 fpm. for an economical as well as an efficient installation and the necessary fan recommendations for handling the required airflow are often made by the radiator manufacturer. The required heat transfer surface (core) is determined from one of a number of curve sheets for a given radiator type having general characteristics as shown in Figure 2. The heat transfer factor and the air pressure drop values are plotted as the ordinate against face velocity values as the abscissa. The heat transfer factors plotted against various dynamic pressures enables the radiator design engineer to compare the performance of different types of surfaces against the same cooling fan. Such performance data is obtained in the laboratory by wind tunnel methods.

The airflow, waterflow and water temperature can be varied and complete performance characteristics of any radiator can be obtained. The standard test section has two square feet face area been increased and to a greater extent than the however complete radiators are tested on the same type of wind tunnel. Additional cooling tests are made on the complete vehicle or power plant after the prototype radiator has been built.

Truck and bus engine horsepower output has heat rejection rate has been decreased while the space available for the radiator has remained constant. This has required the development of "packed" surfaces which have fin spacings as high as 10 per cent and tube spacings as close as ⅜ in. across the face of the core in plate type cores (continuous fin). It is almost mandatory that tubes be arranged in staggered fashion depthwise for maximum efficiency and although greater fan horsepower is required to pump the air through the core the heat transfer factors increase from 10 to 15% over similar "in-line" tube arrange-

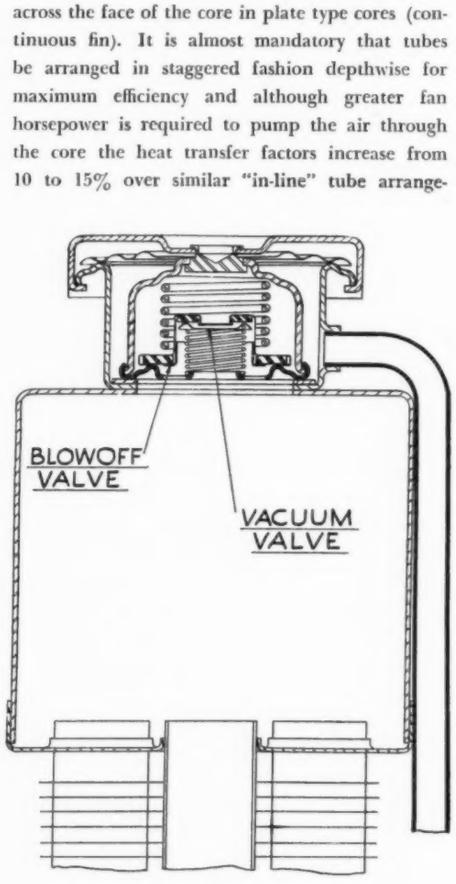


Fig. 3

ments. Heat can be readily extracted from the water because of its high conductivity and the fin embossments shown are necessary to promote air turbulence in order to increase the heat carrying capacity of the airstream.

It is common practice to utilize connection and piping water velocities from 500 to 800 fpm. While this in itself is not unduly high in fluid flow practice it does result in high pressure drops in the engine and radiator connections. A typical radiator flow analysis with 600 fpm. at the inlet and outlet connections would result in approximately 15 fpm. in the tanks and 75 fpm. in the core tubes. Because the pressure drop varies as the square of the velocity the loss in the inlet and outlet connections alone on a radiator is sometimes as much as 60% of the total drop through the radiator. Pump performance can often be greatly improved by lowering the inlet and outlet velocities through increasing the size of the connections and by controlling their shape and configuration so that they are actually transition sections. and not constrictions.

Engine cooling radiators operating under atmospheric pressures have been common in the past, and radiator by-pass thermostats have usually been set for a temperature range of 160 to 170 F. Pressure caps for "sealed cooling" have been available for several years but engine manufacturers have been slow in utilizing them despite their many advantages. Sealed-cooling is now widely used on buses and other carriers largely because evaporation of coolant and surge losses are minimized.

Investigations in the petroleum field also indicate that the formation of crankcase sludge in the lubricating oil is less with the higher operating temperatures obtained. Also the required radiator surface can be reduced.

A typical pressure cap in place in a radiator top tank is shown in Figure 3. Pressure caps usually consist of a spring blow-off valve which protects the radiator by relieving at a pre-set pressure for which the system is designed. A vacuum valve is also incorporated in the cap and this is held against the seat by a lighter spring which permits opening to relieve the vacuum created in the radiator when the engine cools after shutdown.

A similar unit with the valve mechanism "exposed" is produced at lower cost for passenger car application. Common relief pressure settings vary from 3 to 5 psi. (221 to 227 F. boiling point) and pressures as high as 25 psi. (240 F.) are used in liquid cooled aircraft engine applications. The higher pressures require stronger radiators and car heaters and this must be compromised with the radiator size reduction that can be obtained.

Radiator cooling capacity is increased approximately 10% for each 4 psi. radiator pressure. One psi. pressure gives approximately a 3°F. increase in air temperature necessary to cause the radiator to boil. Figure 4 shows the variation in boiling points with the different pressure cap settings at

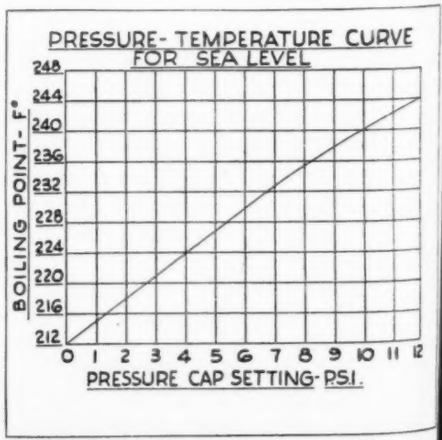


Fig. 4

sea level. On the average the boiling point will decrease approximately 1½° F. for each 1000 ft. above sea level.

Certain truck radiators because of design and other limitations have suffered from "surge" losses despite the use of pressure caps. This is especially serious where a permanent type anti-freeze is used and several truck manufacturers have analyzed this difficulty as being due to the direct impact of a "slug" of water on the relief valve either from road shock or from rapid acceleration and stopping. One device which has been used to offset this mostly in military vehicles, is the simple surge tank.

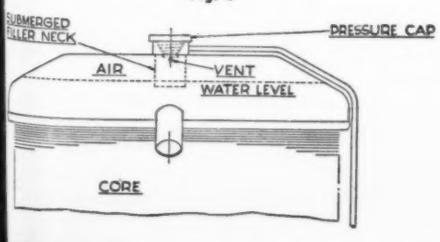
There are several other anti-surge devices that are used singly or in combination. The simplest of these is the submerged filler neck which is shown in Figure 5. The top tank is made higher than ordinary and an air pocket is trapped at the top of the tank when filling. When the pressure becomes excessive in the cooling system most of the air is expelled before any actual water loss occurs. The confined approach to the sealed cooling cap also decreases the possibility of water "slugs" impinging against the relief valve.

One arrangement utilizes a solid baffle, except for a cutout filler space directly below the radiator neck. This leaves an air space as shown which in combination with the looped overflow tube has been successful in overcoming coolant losses. Figure 6 shows a combination of a perforated baffle, submerged filler neck, and water level overflow connected to the pump suction line. Here again the baffle and submerged filler neck provide for an air cushion within the tank. Pressure equalization through the overflow line to the pump suction transfers potential lost water to the other side of the system.

Air swept crankcases provide some oil cooling on passenger cars and on most trucks and buses. Oil temperatures in summer weather will reach the range of 250 to 300 F. at the dip-stick. It is obvious that the temperatures are therefore much greater in other parts of the lubricating system. Granted that an average road vehicle is "getting by," oil cooling with temperature control has the following advantages:

1. Oil volatiles are retained thereby minimizing gumming, varnishing and ring sticking:
2. Oxidation and some forms of sludging are minimized.

Fig. 5



3. Maximum lubrication through pre-selected oil viscosity and temperature is obtained.
4. A portion of the waste engine heat can be taken off in Diesel engines through oil cooled pistons.

Oil cooling for road vehicles can be accomplished *directly* by means of an air cooled oil cooler which can be mounted integrally with the engine cooling radiator. A typical bus arrangement of this type is shown in Figure 7. This oil cooler can be furnished with or without thermostatic control.

The lubricating oil on road vehicles may also be cooled *indirectly* through a water-cooled oil cooler installed in the jacket water circuit between the radiator outlet and the engine. The oil flow path is through the tubes which are fitted with removable agitators and which increase the heat transfer capacity by approximately 75%.

Stationary internal combustion engines require oil cooling in capacities above 35 bhp. Automotive engines when adapted to marine or stationary use also require oil cooling. One type cools both

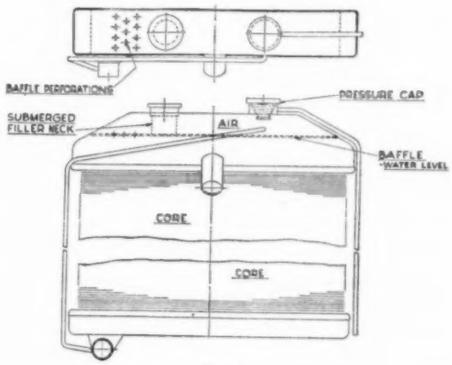


Fig. 6

engine jacket water and lube oil by the circulation of water through the tubes.

In the overall picture the advantage lies with the water cooled type oil cooler when used with a radiator type jacket water cooling system. The oil is warmed on cold starting as the jacket water warms and a measure of secondary oil temperature control is obtained.

Hydraulic drives or so-called torque converters as used in buses and other heavy vehicles require oil cooling. They utilize extremely light oil which can be satisfactorily cooled with a tube and shell type heat exchanger installed in the jacket water circuit.

In heavy duty sectionalized radiator constructions castings have been eliminated entirely and tanks and sectional headers are weldments. Such radiators are used on portable air compressors and heavy duty power units. The handle-like strap over the top of the radiator provides support for the hood or shell which covers the front and top.

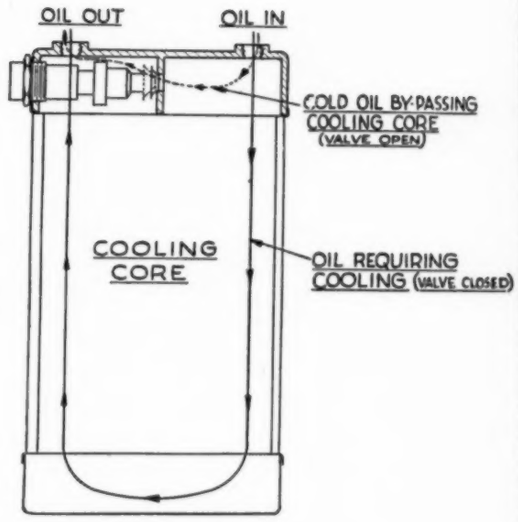
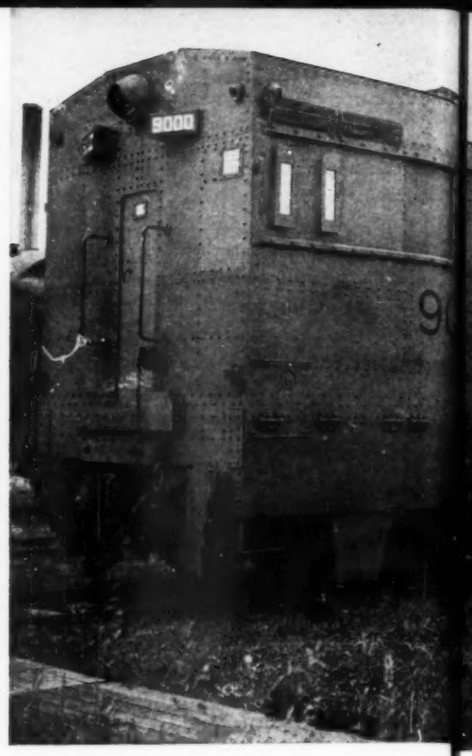


Fig. 7

The radiator constructions so far discussed are not adaptable to engine capacities in excess of 200 hp. Radiators for engines as large as 700 hp. require exceedingly heavy construction by comparison. All sub-assemblies are weldments and the only grey-iron casting used is the fan bearing housing. Manual shutters suitable for seasonal adjustment are used. Because of the size of this radiator it is necessary to use a center tank and two banks of radiator sections. The fan shroud has a double curved lip in contrast to the usual single curved inlet. This permits either a blower type or exhauster type propeller fan to be used. The fan is of adjustable pitch construction and the blades are of cast aluminum with airfoil section. Fans of this type and size attain mechanical efficiencies up to 65%.

VAD cooling units (vertical air discharge) are built in four sizes having water cooling capacities up to 12,000,000 Btu. per hour. This is equivalent to an engine cooling load of 4000 hp. These units can also be equipped with steam condensing coils and will condense up to 40,000 pounds of steam per hour at 10 psi. and 100 F. entering air.

Supercharging Diesel engines as a means of increasing power has been developed within the last ten years. The charged air is heated during compression and the volumetric efficiency of the engine can be increased if the air is cooled before it enters the engine cylinders. However water or airflow is necessary as a cooling agent and on ordinary applications intercooling is uneconomical. Marine applications are an exception for cooling water may be had for the pumping and intercoolers have been applied with resultant engine power increases of as much as 10% at top engine speed. Water is circulated through the flat tubes of a special non-ferrous tube and fine core having a high ratio of tube to fin surface. The supercharged air flows around the fins and over the outside tube surface. Such coolers are designed specifically for each engine and are made to blend with exterior lines.



DIESELIZATION OF CANADIAN RA

DESPITE the fact that Canada put her first Diesel-electric locomotive in service back in 1925, it is only recently that the Canadian National Railways have entered into the railroad Dieselization program so zestfully being carried on now by our own railroads.

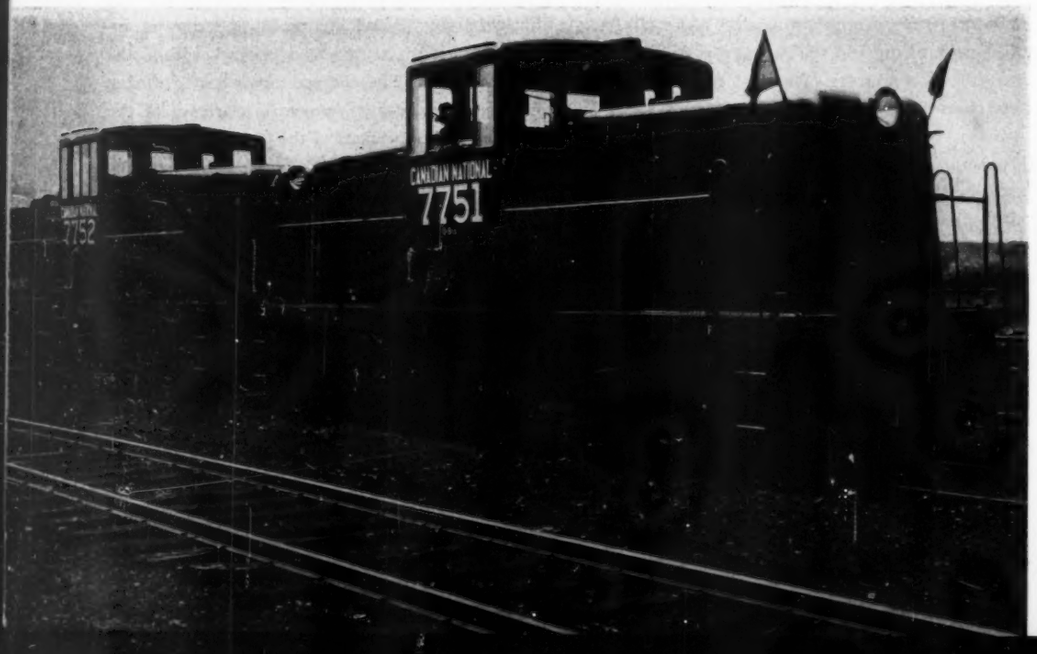
Last July Canada had a preview of what it could expect in the next few years when General Motors brought a shiny new 4,500 hp. Diesel electric over to Montreal for her Canadian debut, a 335 mile run from Montreal to Toronto, hauling a thirteen car train. Aboard her in addition to the regular passengers were the technical brains of the Canadian National Railroads riding in the cab and in the special dynamometer car just behind the Diesel checking the locomotive performance. They were impressed by the speed and power of the Diesel. This premiere was followed by a series of exhaustive tests, over 7,446 miles in all under all the varied conditions of freight and passenger service. It was the acid test.

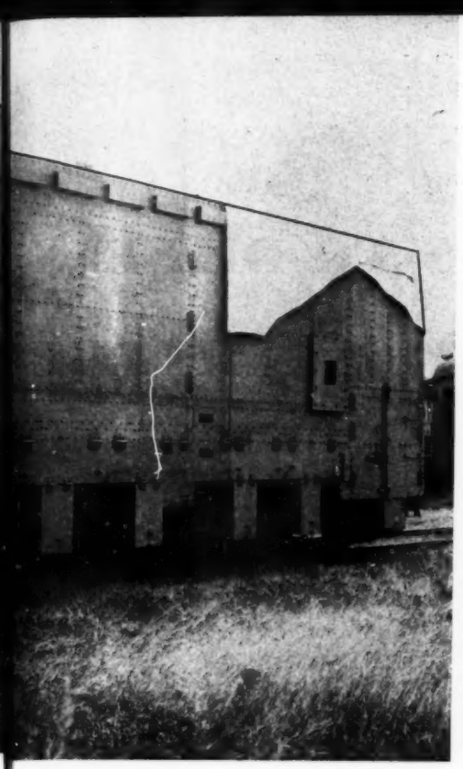
Late in November the placing of orders for two Diesel electric locomotives was announced by R. C. Vaughan, C.M.G., chairman and president, Canadian National Railways. The locomotives consist of three units of 1500 hp. each making two triple-unit, 4500 horsepower locomotives. They will be built by the Electro-Motive Division of General Motors and are the first road Diesels to be ordered for Canada.

The new streamlined Diesels can serve as heavy duty freight locomotives with a top speed of 50 mph., or handle long, standard weight pullman trains up to 102 mph. The units of 1500 horsepower each may be coupled in combinations of one, two or three units to provide 1500, 3000 or 4500 horsepower. Power is generated in three 16-cylinder two stroke cycle engines, any one of which may be cut out of service temporarily for repair work. Running repairs may be made without interruption of service, including replacement of pistons, cylinder liners and bearing shells. Current is led from the generator to traction motors located in the trucks which are geared directly to the driving axles. Pairs of motors to each truck may be handled independently.

An outstanding feature of the new type locomotive is its ability to start long heavy trains quickly and smoothly, and to keep pulling them at a con-

Two 44-ton 380 hp. Alco-G.E. Diesel electrics await shipment to Prince Edward Island for service with the Canadian National Railways. Prince Edward Line will soon be completely Dieselized.





Above, 3-unit, 4500 hp. General Motors Diesel locomotive. Two of these, recently ordered by the Canadian National Railways, will be the first road Diesels ordered for Canada. Left, Canada's veteran Diesel locomotive the "9000" which saw wartime service hauling an armoured train.

RAILROADS

By GEORGE D. CROSSLEY

stant speed up long grades. A dynamic braking system enables the engineer to retard the train speed for curves or other conditions by loading the traction motors to check their speed without applying brakes to the wheels.

The new Diesels carry 3,600 gallons of fuel oil and can haul a 100-car freight train under average operating conditions between 450 and 500 miles before refueling. Each unit is 151 feet four inches long, 15 feet high from rails, and 10 feet 7 inches wide, and weighs 350 tons.

Also in July last year another test was made. This time with a 1500 hp. freight Diesel of American Locomotive Co. manufacture powered with a 12 cylinder, turbo-supercharged Diesel. It was one of the most extensive and thorough tests that a locomotive had undergone in Canada. It consisted in hauling a fully-loaded 35-car freight train for 3,260 miles over a period of eighteen days through some of the toughest railroading country in Canada. Again, the motive power experts checked the performance records of the Diesel and again were impressed.

As a result of these and other tests, the Canadian National Railways now have on order 58 Diesel electric locomotives in addition to the General Motors Road Diesels mentioned above. 18 will be constructed by the Electro-Motive Division of General Motors, 18 by the Canadian Locomotive Company, 10 by the American Locomotive Company, and 2 by the General Electric Company. Already the system has a fleet of fifty Diesels in switching service in thirty terminals across the Dominion. In addition there are 29 Diesel units in local services throughout the country. This will total up to 127 Diesel units when the new motive power is delivered.

Today the company needs light engines to meet the demands of a number of branch lines. In particular is the Prince Edward Island line. Three important factors governed the company's decision to Dieselize this line both for passenger and freight service. First there was the island's water supply and the difficulty of obtaining sufficient water for steam locomotive operation. Secondly was the need of large quantities of coal which had to be ferried across to the island taking space which could be used for vital freight shipments.

Thirdly and most important was the fact that 25% could be saved by using Diesels instead of steam locomotives because of the fuel differential.

For this service 18 units of 660 hp. and 2 units of 380 hp. will be used. The larger Diesels will be 40 feet long and the smaller ones 35 feet. Both types will be ten feet wide and fourteen feet high from the rail. All will be equipped with 400 gallon fuel tanks with sufficient fuel for 400 mile runs. To heat passenger trains the Diesels will be equipped with specially built tenders equipped with automatic oil-fired boilers.

Use of Diesels will eliminate all but two of the 19 water stations on the line. Only three fueling stations will be required. The present repair shop will serve as a servicing and repair shop with minor changes in arrangement.

The remaining 28 Diesels which are on order will be Diesel-electric switchers for terminal duty throughout the Canadian system.

One of the most interesting sidelights of the Canadian National Railways Diesel history is the story of the 9000, an American-built Diesel locomotive whcih has been in service since 1928. During the war, this locomotive was completely remodeled and was used to furnish power for an armoured train on Canada's West Coast during the threat of Japanese invasion. The locomotive was shielded with armour plate and camouflaged to look like a box car, making it difficult for the enemy to spot it in case of attack. It drew a train of four steel flat cars and three steel box cars also armoured and equipped with anti-aircraft weapons. Now the old 9000 having served with distinction for 20 years will go back into service for another generation or two.

The Canadian National Railways ,which introduced Diesel-electric power for railway service in Canada, also holds the distinction of building the first oil-electric railcar to make a transcontinental run—67 hours from Montreal to Vancouver.

ITALY TURNS TO DIESELS IN COAL SHORTAGE

By ANTONIO GIORDANO

THE shortage of solid fuel has raised the problem of the conversion from coal to oil and the employment of Diesel machinery especially in the output of power. Among the Italian concerns which have taken up the question it may be mentioned that the Societa Generale Elettrica della Sicilia which, in addition to the reconstruction of its old electric plants severely hit by the war, has started the construction of new electric plants in order to increase the output of electricity in the big Italian island. Since Sicily is short of water power, and, on the other hand, the exploitation of the existing water resources would have involved the construction of plants which could be completed only in three or four years, preference has been given to a program of Diesel electric plants the first of which is the medium size Messina plant.

Such an electric plant has installed power of 11,600 kw. divided in three identical Diesel electric generating sets each consisting of a Fiat Diesel engine of the power of 5,400 hp. at 187.5 rpm. coupled to a three phase electric generator of 5,600 bkw. at 10,000 ÷ 11,000 v. and 50 cycles built by the Officine di Savigliano at Turin.

This is not only the first Sicilian but also the first Italian electric power station by Diesel machinery built for constant service and not as stand by as has been the case of all the Diesel electric plants previously built in this country.

Taking into consideration the importance of the service to be rendered by the new plant it is to be noted that double acting Diesels operating at a rather high speed will be utilized and moreover they have been designed for the use of boiler oil instead than Diesel oil.

The Stabilimento Grandi Motori Fiat, thanks to its long experience in the marine field, has proved the feasibility of using boiler oil. In particular the Stabilimento Grandi Motori Fiat has taken upon its shoulders both the operation and the maintenance of the Diesel machinery against the payment of an yearly remuneration just as it is being done with shipowners in the marine field. The three sets are already in operation.

The three generating sets consist each of the following machinery:

A Fiat Diesel engine of the 655 DE type working on the two-cycle, double-acting principle, with five cylinders having a diameter of 650 m/m and a stroke of 960 m/m. Each engine, which is directly coupled its own air pump, develops at 187.5 rpm. a normal uninterrupted power of 5,400 hp. and the maximum power of 5,950 hp. At the trials these engines might reach, under conditions of maximum overload for an hour, the power of 6,500 hp. always at the same speed of 187.5 rpm. At the normal power of 5,400 hp. at 187.5 rpm. corresponds an mean effective pressure of 4.6/kg. sq.cm. and an average piston speed of 6 m/s.

An open type electric generator built by the Officine di Savigliano at Turin with double supports and coaxial main and secondary exciters of the power of 5,600 bkw. per cos = 0,7 at the tensions from 10.000 to 11.000 volts at 50 cycles.

The auxiliary functions of the engine are the same of those employed for marine propulsion plants, and consequently each engine is fitted with its own general lubrication and piston cooling oil collecting tank, an oil circulating pump, a water circulating pump, an oil filter, an oil cooling system with three sets in parallel, and a water cooling system. There is a single starting air system, which includes two electric air compressors and two tanks, the oil depuration and transfer plant, the oil engine feeding circuit plant, the salt water circulation circuit for the cooling of the oil and water.

The three generating sets are installed in a building measuring 20 by 40 meters served by a bridge crane of 40 tons capacity. At one side of the engine room there is the main electric switch board, and on the other side the repair shop. The floor of the main engine room is two meters higher than the neighboring ground.

The auxiliary services are distributed in a double floor wing of the building measuring 6 by 40 meters. The first floor is two meters lower than the floor of the main engine room while the second floor is placed practically at the height of the aspiration and exhaust collectors of the engines.

In the lower room, which is served by a bridge crane with a lifting capacity of 6 tons, are fitted the pumps, coolers, fuel oil and lubricating oil service tanks, depurators, etc., while in the upper room are the air pumps aspirators and the exhaust silencers.

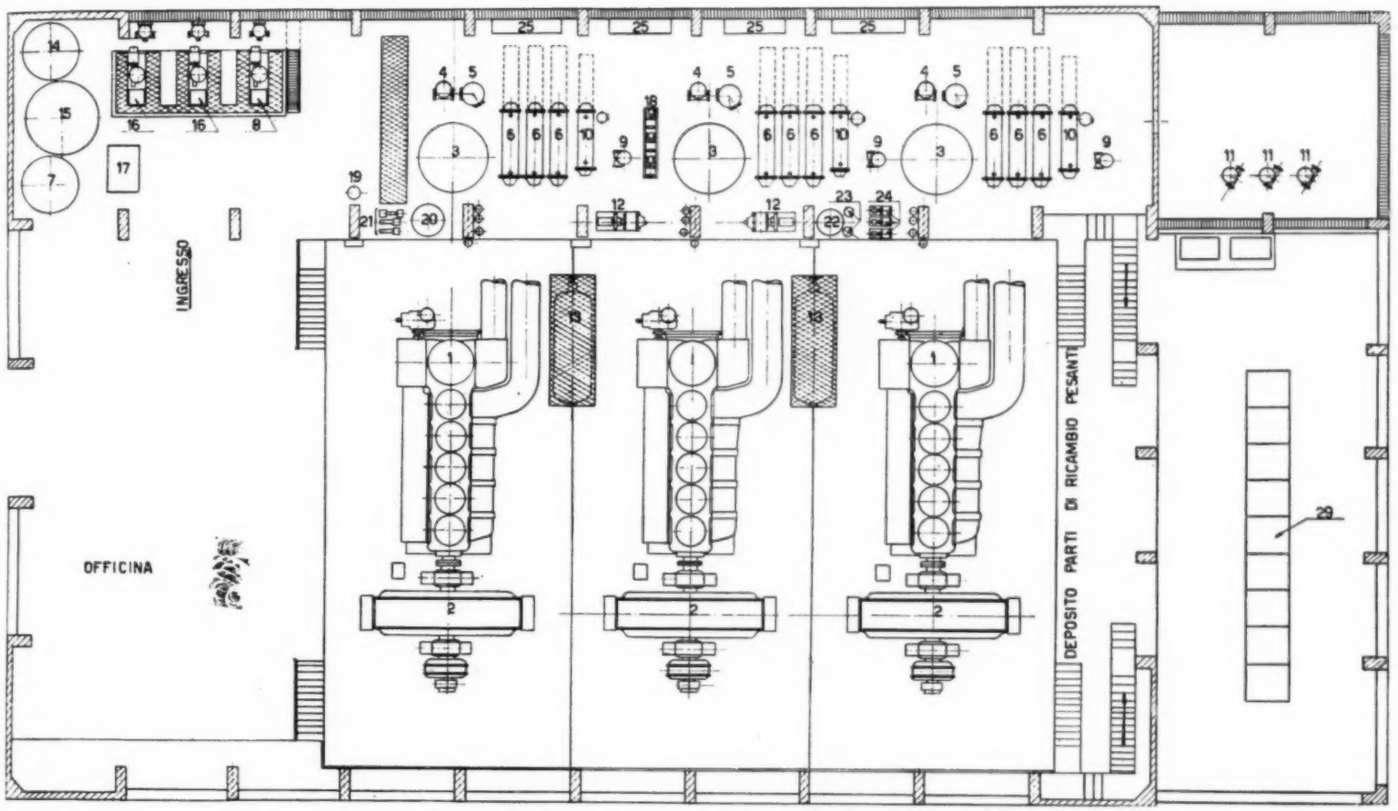
The arrangement of the machinery follows that of the latest American Diesel electric plants:

In addition to the above mentioned problems the builders of the Messina Diesel electric plant have had to face the following:

a) Vibrations of the engines among which had to be taken into consideration 1.) the vertical vibrations which have been reduced to the minimum through the best possible balancing of the rotation and alternate masses and the appropriate proportioning of the foundations of the building, 2.) the transverse vibrations which appeared negligible at the beginning owing to the moderate length of the engine, and 3.) the torsional vibrations eliminated through the proportioning of the various rotating parts in such a way that in the whole field from 0 to 200 rpm., abnormal vibration have been avoided. Furthermore as a trial the first two engines have been provided with two different types of damping flywheels.

b) The regulation of the speed has been obtained through two centrifugal governors: one for the operation and one of safety. Both regulators are driven by the distribution shaft. The first acts continuously through an oil servomotor which regulates the output on the basis of the demand for power, while the second intervenes only when the speed exceeds a certain established limit causing the immediate stoppage of the fuel pumps. The normal speed of the governor can be changed at the governor as well as from the general switch board of the plant.

Practically all the engine controls may be operated electrically from the main switch board. To increase the safety of the operation, the lubrication and cooling equipment is fitted with visual and



Layout for Sicilian power plant includes three 5400 hp, 187.5 rpm Fiat Diesels. This is the first Italian Stationary Diesel installation for other than standby service.

sound alarm signals which automatically cut in as soon as failure occurs. Similar control devices are installed on auxiliary equipment.

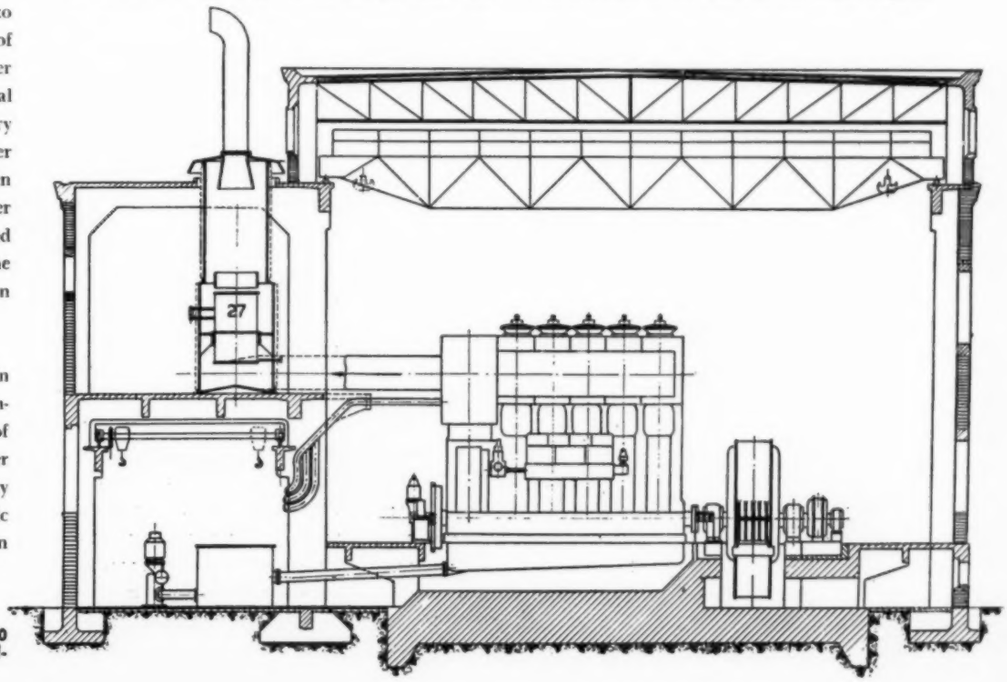
Extensive use of acoustic insulation has cut down mechanical noise levels. The noise caused by the scavenging air pumps has been practically eliminated by leading the air pipes outside of the main engine room and providing them with silencers.

As it has been pointed out these engines are to use boiler oil representing the lowest quality of fuel offered on the market. Before use, the boiler oil is heat depurated through two large centrifugal depurators of the Veronesi type. It is necessary to feed the boiler oil into the engines at over 100° C. in order to lower the viscosity to between 1 and 2° E. The steam necessary to heat the boiler oil in the depurators and in the heaters is supplied from the exhaust gas boilers inserted in the silencers or, when the engines are started, from an electric boiler of 70 kw.

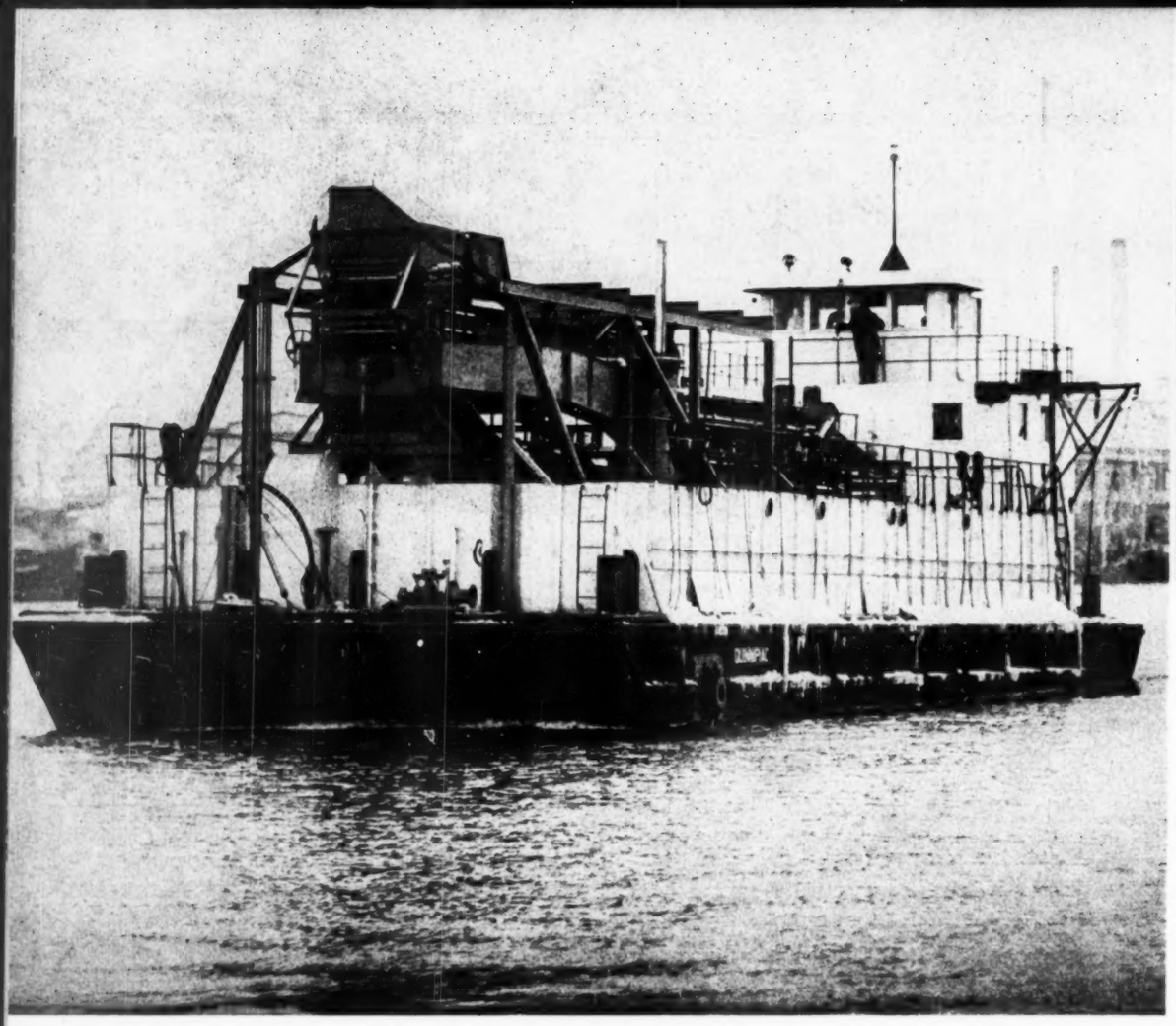
The consumption of fuel per kwh is of course in relation with the calorific power of the fuel employed. In the case of a good "Diesel oil" of d = 0.9 to 15° and of calorific power of over 10,500,000 cal./kg. and in the case of a low quality "boiler oil" of d = 0.98 to 15° and of calorific power of over 9,800,000 cal./kg. the consumption (with toleration of 2.5%) have been established as follows:

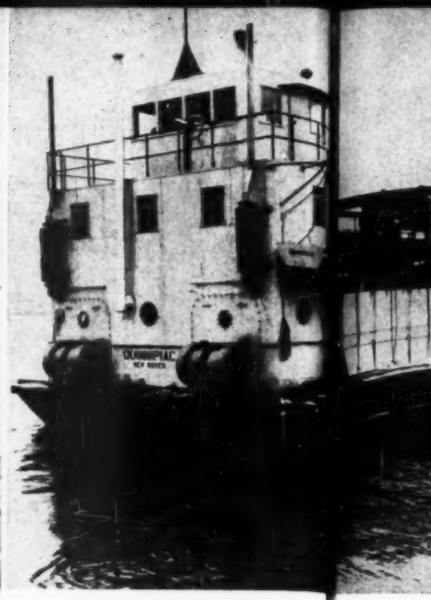
Diesel oil	Boiler oil			
254	276	grammes	at full	load
265	287	"	" ¾	"
300	324	"	" ½	"

It is expected that a further reduction of the consumption will be obtained through the insertion of an exhaust gas turbine which operating a turbo blower or an electric generator should allow the recovery of the power from 2 to 3% of the output of the set. In regard to the consumption of lubricating oil the contract consumption has been fixed in 2 grammes per kwh. but the Stabilimento Grandi Motori Fiat expect to realize a consumption of not more than 1.45 grammes per kwh. owing to improvements realized in the quality of such oils as well as owing to special devices fitted to the lubrication pumps which govern the power in relation to the load of the main engine.



Installation drawing of 5 cylinder Fiat Diesel and 10,000 volt 50 cycle A.C. generator. Layout is designed according to latest American standards.





(Left) Diesel oyster dredge Quinnipiac showing deck conveyor system. Flanged opening in sts to 82-foot dredging gear. (Above) Stern view of 165 hp Diesel master units by Murray and Tregurtha board. Maxim seen a

DIESEL DDGE

By

EAST Coast oystermen will take an appreciative second look at the *Quinnipiac*. The *Quinnipiac* is a new type oyster dredge converted from a Navy barge by Murray and Tregurtha, Inc., for F. Mansfield and Sons, Inc., of New Haven, Conn. It incorporates the latest developments in Diesel marine propulsion and suction dredging to make oystering a much simpler job. The oyster business still depends mainly on manual labor for many of its varied operations. This fact stems from the hesitancy of growers to adopt mechanical methods which might result in damage to the oyster. This fear has resulted in a lack of progress in efficient handling operations.

The conventional oyster dredge as used today utilizes a drag bucket which is towed along the bottom. When, in the judgment of the skipper, the oyster drag is full, it is hauled on deck where it is emptied and lowered to the bottom again. This cycle is repeated, alternately on each side of the vessel when two drags are used, until further dredging becomes unprofitable. Since this is an intermittant operation, with the vessel moving ahead between hauls, parts of the bed are missed, even with good piloting on the part of the skipper. In addition to the problem of dredging an oyster bed clean of oysters, is the necessity of removing two of the oysters most dangerous enemies, the starfish and the drill, the drill being a snail-like creature which bores its way through the shell of the oyster, thus destroying it. In some localities these drills are so numerous that they have become a major concern to oyster growers. The conventional method of dredging oysters does little to combat this pest and suction dredging is the only known means by which they may be efficiently removed from the oyster bed.

Suction dredging for this purpose of removing drills has been utilized in the industry for about twelve years but its use in the actual dredging of oysters has not been too successful since the oysters, passing through the suction pump, were damaged.

It was not until the F. Mansfield & Sons decided to build the *Quinnipiac* that any constructive solution to this problem was put forward. J. Richards Nelson of the dredging company decided to do something about it. A YCK type wooden lighter was purchased from the Navy and Gordon Munro, marine architect, of Quincy, Mass., was commissioned to furnish designs to convert it to a self-propelled suction dredge. Murray & Tregurtha, Inc., was assigned the task of the reconversion job. Two outstanding innovations were incorporated in the dredge. First was the use of Murray & Tregurtha Diesel outboard propulsion units, which permitted pin point maneuverability of the dredge, enabling exact positioning of the dredge over any part of an oyster bed, and second, the use of an eductor fitted suction pump which permitted the dredging of oysters without having them pass through the pump. This second innovation meant that oysters could be successfully dredged without damage to them.

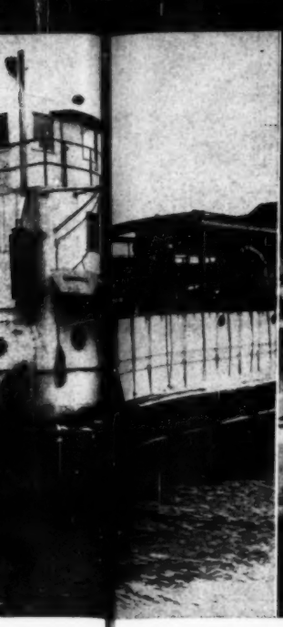
The general arrangement of the *Quinnipiac* shows a 95 foot x 30 foot hull with a steel deck house aft which houses the two 165 hp. Deisel Harbormaster propulsion units at main deck level. These two units, controlled from the pilot house above, propel as well as steer the vessel, and are the key to the maneuverability of the otherwise cumbersome dredge. The engine room is spacious and has 7 feet of headroom features not found in conventional installations. The engines themselves are General Motors 6-71's and they operate at 1850 rpm. for a propeller speed of 317 rpm. At this engine speed the dredge moves at 8 knots. The starboard propulsion Diesel is equipped with a Curtis Compressor for whistle air and a Delco-Remy 12-volt, 900 watt, DC generator which charges the 12 volt battery system. The port Diesel also drives an auxiliary generator, a 32 volt, 900 watt Delco-Remy, which supplies light and power through the ship's service battery system. On the front power take-off is installed a Twin Disc clutch which is utilized to drive a winch

for lifting
used for d
generator,
on the p
filters and
on both e

The living
tion of the
the captai
the galley
on two sid

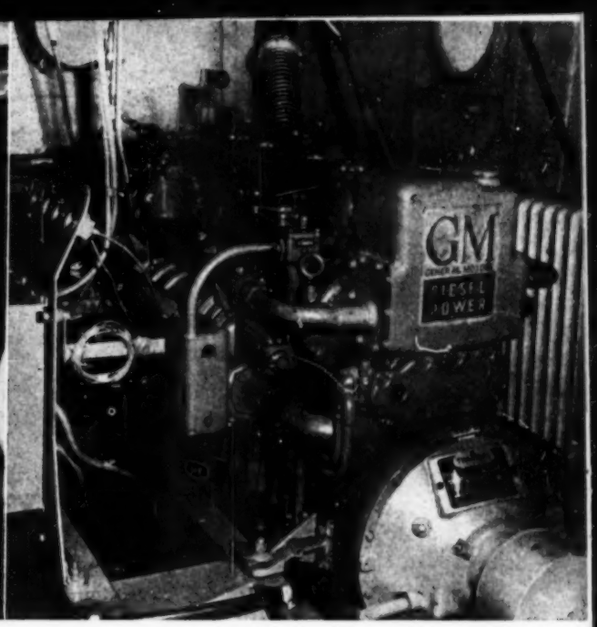
The spaci
living qua
for handlin
conveying
the captai
and has in

Forward of
to the bow
with steel
built to a h
the deck sp
aft for the
bins port a
as settling t
the bins ha
ports, which



redge Quinnipi showing deck bins and ged opening cts to 82-foot suction e) Stern view o 165 hp Diesel Harbor- and Tregurtha board. Maxim silencers seen a

Twin G-M Diesel developing 300 hp. drives 12-inch Marley pump for dredging operations. Diesel also drives hydraulic pump for conveying system.



View of port propulsion engine, a 165 hp. General Motors Diesel equipped with a Twin Disc clutch on front power take-off.

L DDGE REVOLUTIONIZES OYSTER "FARMING"

By BRUCE C. SISSON

for lifting and lowering the 82-foot suction pipe used for dredging. A U. S. Motors auxiliary Diesel generator, developing 3.3 hp. is installed forward on the port side of the engine room. A-C oil filters and Sperry Exactor controls are installed on both engines.

The living quarters are located in the upper portion of the deck house and contain staterooms for the captain, engineer and a crew of four men, the galley and messroom. All rooms have windows on two sides to insure good light and ventilation.

The spacious pilot house is located above the living quarters. Here are installed the controls for handling the vessel as well as the pumping and conveying machinery. From the control station the captain can observe all dredging operations and has instant control of all equipment.

Forward of the deck house and extending nearly to the bow, the wooden deck has been covered with steel and steel cargo bulwarks have been built to a height of six feet. These bulwarks divide the deck space into large single bins forward and aft for the storage of oysters, while three smaller bins port and starboard amidships are designed as settling tanks for mud, sand, and drills. All of the bins have ports opening on each side. These ports, which are opened from a catwalk on top of the bins, are used when discharging the contents of the settling tanks overboard, or when planting shells or replanting oysters. The forward and after bins have a capacity of 5000 bushels of oysters, while all bins have a combined capacity of nearly 10,000 bushels of shells.

The pumping equipment which operates the suction dredge is located in the forward hold and consists of a 12 in. Morris centrifugal pump driven by twin General Motors 6-71 Diesels through an hydraulic coupling. The pump suction is piped to a large sea chest installed in the bottom of the large. The pump discharge is connected to an eductor supplied by New York Engineering which has a minimum throat opening of 8½ inches, which with its venturi effect pulls a suction on the 82-foot suction pipe used for dredging. This pipe consists of alternate lengths of 10 inch steel and rubber pipe with a nozzle at the lower end. This suction piping, which permits dredging in water up to 50 feet deep enters the hull near the bow and is connected to the eductor, thus the dredged material does not pass through the pump. From the eductor the piping is carried up through the deck to a filter house, where all the dredged material is discharged onto a special type of screening conveyor. The large oysters are here screened out and deposited on an overhead conveyor thence on the main shuttle conveyor to either forward or after storage bin. Meanwhile, the smaller oysters go through a similar cycle on a second screening conveyor, through which all other material passes for deposit in the amidship bins by means of chutes. The flow of water, etc., from the filter house is controlled by gates so it may be diverted to either side of the barge and thence overboard at will.

All the conveyors which were made by Alden Engineering Co. are driven by Vickers hydraulic motors which are supplied pressure by a pump driven off the G-M twin in the forward hold. A bilge drainage system is tied into the main suction line for emergency use, while a small auxiliary Jabsco bilge pump is located aft to take care of ordinary seepage. A 6 inch pressure main is also installed, with branches leading to hydrants on deck for use in washing shells and mud overboard during unloading operations.

All operations are subject to instant control by the captain from the pilot house: propulsion steering, pump and conveyer controls are all within easy reach. From tests already made, it is believed that the *Quinnipiac* will have a working capacity of 1500 bushels of oysters per hour. This vessel was used for planting shells during the late summer and did an enormous amount of work, planting upwards of 9000 bushels at a time.

DESIGN FOR WELDED EXHAUST MANIFOLD WINS LINCOLN AWARD

Paper Describing Manufacture of Divided Exhaust Manifold for Supercharged Diesels Stresses Simple Construction

Written material and illustrations for this article are taken from a study submitted to The James F. Lincoln Arc Welding Foundation by Ben A. Hausfeld, Engineer, Dayton Fabricated Steel Company, Dayton, Ohio; Dr. E. C. Magdeburger, Head Diesel Engineer, Bureau of Ships, U. S. Navy Department, Washington, D. C. and John L. Ostborg, Assistant Chief Engineer, National Supply Company, Springfield, Ohio, in its recent $200,000 Design-For-Progress Award Program for reports and advances and improvements made by the applications of arc welding in design, fabrication, construction and maintenance.

As long as human civilization exists, men will strive to make "better mousetraps" and improve the means for making them. Resistance welding is an improved means for joining steel parts and a divided exhaust manifold for supercharged internal combustion engines has proven itself a "better mousetrap."

The supercharging of Diesel engines is not new, but was slow to develop in this country and it was not until shortly before the war that a reliable model of a well-known turbocharger was being produced by an American manufacturer. The war made it necessary to push the application of supercharging so that now practically all medium and slow speed four-cycle Diesel engines in the United States are available with superchargers. This has meant an increase in engine output of heavy duty engines up to 60 per cent at present day ratings and this increase was made possible with little change in the physical space required by the engine, thus enhancing its usefulness enormously as a prime mover for all types of installations.

Dr. Alfred Buchi, the inventor of the turbocharger, found that a divided manifold was essential to the efficient operation of the gas turbine driving the centrifugal blower, designed to convert the otherwise wasted energy of the exhaust gases into compressed air for supercharging the engine. However, the original efficiencies of both turbine and blower were low and Buchi felt it necessary that the divided manifold be uncooled to preserve the thermal energy of the exhaust gases. The problem was solved by using lagged individual pipes, with expansion joints, to connect groups of two or three engine cylinders to the turbine nozzle box. However, the heat given off to the engine room was often oppressively excessive, even dangerous, and the exhaust system was cumbersome to handle when the engine was serviced. These disadvantages retarded the use of the Buchi supercharging method in America.

Individual engine builders have solved these difficulties in their own way, but one design which enjoys widespread use is that marketed under the trade name of "Helixhaust" manifold. This design provides a water-cooled, cylindrical manifold to minimize heat transfer to the engine room, and does not differ in outward appearance from the conventional manifold. The gas space is divided into a number of separate passages, one for every two cylinders, by means of helical vanes so that two cylinders exhausting into each passage, fire 360° crankshaft angle apart, so that there will be no blowback of exhaust gases from one cylinder to the other.

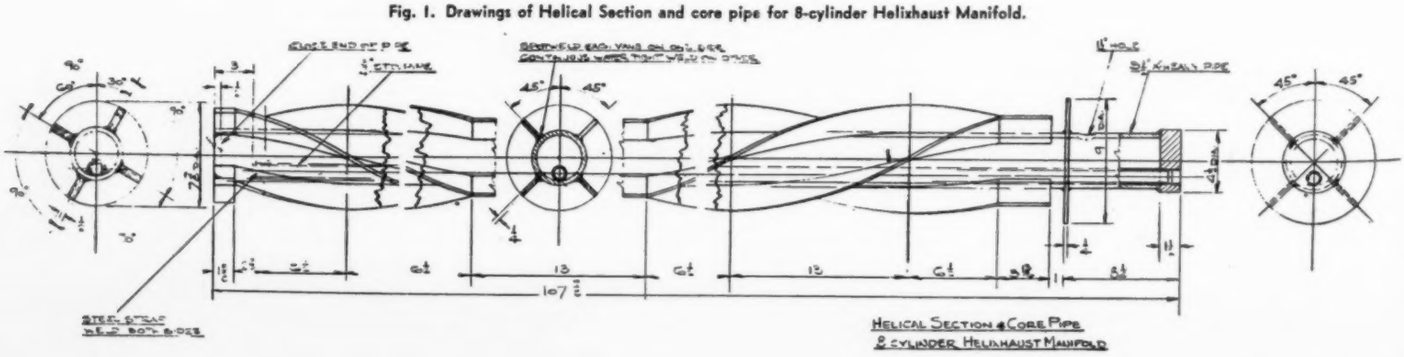
Originally it was intended to cast the central core with its helical vanes and insert it into a water jacketed pipe fitted with individual cylinder leads, but tests indicated that the separate gas passages had to be gas tight to retain the initial slug of exhaust gases of higher pressure, which is the principal contribution of Buchi to the success of supercharging. Results were no better with a welded element inserted in the same manner, and it was at this point that a completely welded design was decided upon as the correct approach. To provide a practical way of welding the helical vanes into a single central core as well as to guard against any danger from expansion of uncooled vanes, a water cooled core pipe was then adopted.

Since quantity requirements were low, it was decided that a manifold using standard pipe, pipe fittings available on the open market and simple steel castings was desirable from a cost standpoint.

No special materials were to be used but it has taken good judgment and experience to determine the proper distribution of metal to alleviate the high heat stresses resulting from the high temperature exhaust gases and relatively cold water.

The first step in the design was to determine the size of the core pipe and inner shell, the space

Fig. 1. Drawings of Helical Section and core pipe for 8-cylinder Helixhaust Manifold.



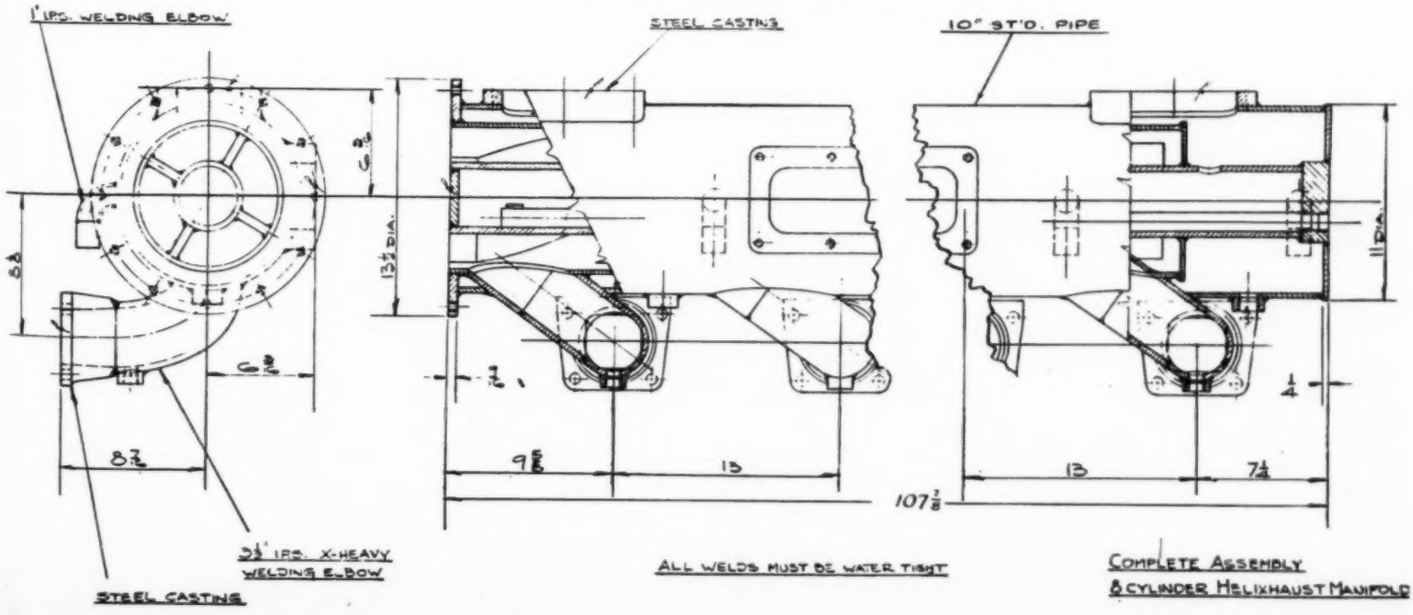
Inner shell sections of manifold being welded together.

between them to be subdivided by helical vanes to give one passage for every two cylinders. The cross-sectional area of each passage was determined by years of experience and tests for optimum efficiency of the turbine. In our particular case, the inner shell was made of 8-inch standard pipe and the core pipe 3½-inch extra heavy pipe to equalize heat stresses. The vanes were made of ¼-inch plate with a straight section at the center of the manifold and helically twisted in opposite sense to either end of the manifold. Individual cylinders are connected by standard elbows. As stated before, each passage thus formed takes the exhaust gases from two cylinders which are 360° crankshaft travel apart in firing sequence. The elbows were chosen to give an inside area about equal to the passage area, and are extra heavy to give longer life against gas erosion. They are inclined at an angle of 35° with the axis of the manifold to give a gentle transition to minimize gas turbulence.

To facilitate manufacture and prevent warpage and twist, all vanes were made full length but the dead ends of each passage are blocked off by stop plates set at the same angle as the elbows. To cool the core pipe a ¾ inch standard pipe was welded in place inside the core pipe so that the cooling water would enter from the free end of the manifold, flow to the turbocharger end, enter into the 3½-inch core pipe, flow back and join the rest of the cooling water through a hole in the core pipe at the free end. The main cooling jacket was made by putting a 10-inch standard pipe over the whole assembly, the cooling water to enter the jacket through separate leads from each cylinder, flow along the manifold and out through an opening at the top. Steel castings were used to provide several clean-out openings and also to make flanges which would match with the manifold elbows and cylinder head exhaust passage openings.

No attempt will be made in this paper to give a comparative analysis with any other means of

Fig. 2. Partial drawings of complete assembly of manifold.



construction because it is the belief of the authors that no other method of construction except welding can be economically employed.

The actual procedure for construction of the "Helixhaust" manifold after all engineering and working drawings are completed is as follows:

A ¾-inch standard pipe screwed into a 4½-inch disks is inserted into the 3½-inch extra heavy core pipe (See Fig. 1) and a clip is welded over the ¾-inch pipe at the free end inside the core pipe to hold the pipe but permit expansion. The other end of the core is plugged with another solid disk welded in place. The vanes are cut as circular arcs, the radii being determined mathematically, from flat plate and bent to the proper helical form. The straight vane portions in the center are put on the core pipe first and then the helical vanes, all vanes being firmly joined where they butt, and tack welded to the core pipe on one side with a full fillet weld on the other.

All welding is started at the center and progresses toward each end to give equal shrinkage and minimize residual stresses. Approximately ⅜-inch is allowed for overall shrinkage. After this, the spiral core is cleaned of all slag and splatter. The inner shell or outer wall of the gas passages is made of 8-inch standard pipe cut into 12-inch lengths which are slipped over the core and welded internally to the vanes, on one side only, in a continuous weld to give a gas tight joint between passages. As the work progresses, the circumferential welds are made and the stop plates, blocking off the dead ends of the gas passages, are also welded in place with gas tight joints.

This welding and all subsequent welding is done on a welding position using a tail stock. Up to this point most welds are made with an E-6012 type electrode and in all subsequent welding an E-6020 type electrode is used when possible. All welds are cleaned as they are made so that no loose particles will remain to cause damage to the turbine when it is in operation.

The gas chambers are then tested hydrostatically at 60 psi for any leaks. After testing, the prefabricated elbow and flange assemblies are welded in place. Jigs and tie-bars are used to maintain alignment and approximately ⅛-inch is allowed for overall shrinkage. In the completed manifold the center to center distance of the flanges is held to plus or minus 1/16-inch. When the flange assemblies are in place the manifold is given a dimensional check and corrections made if necessary, after which it is again tested hydrostatically.

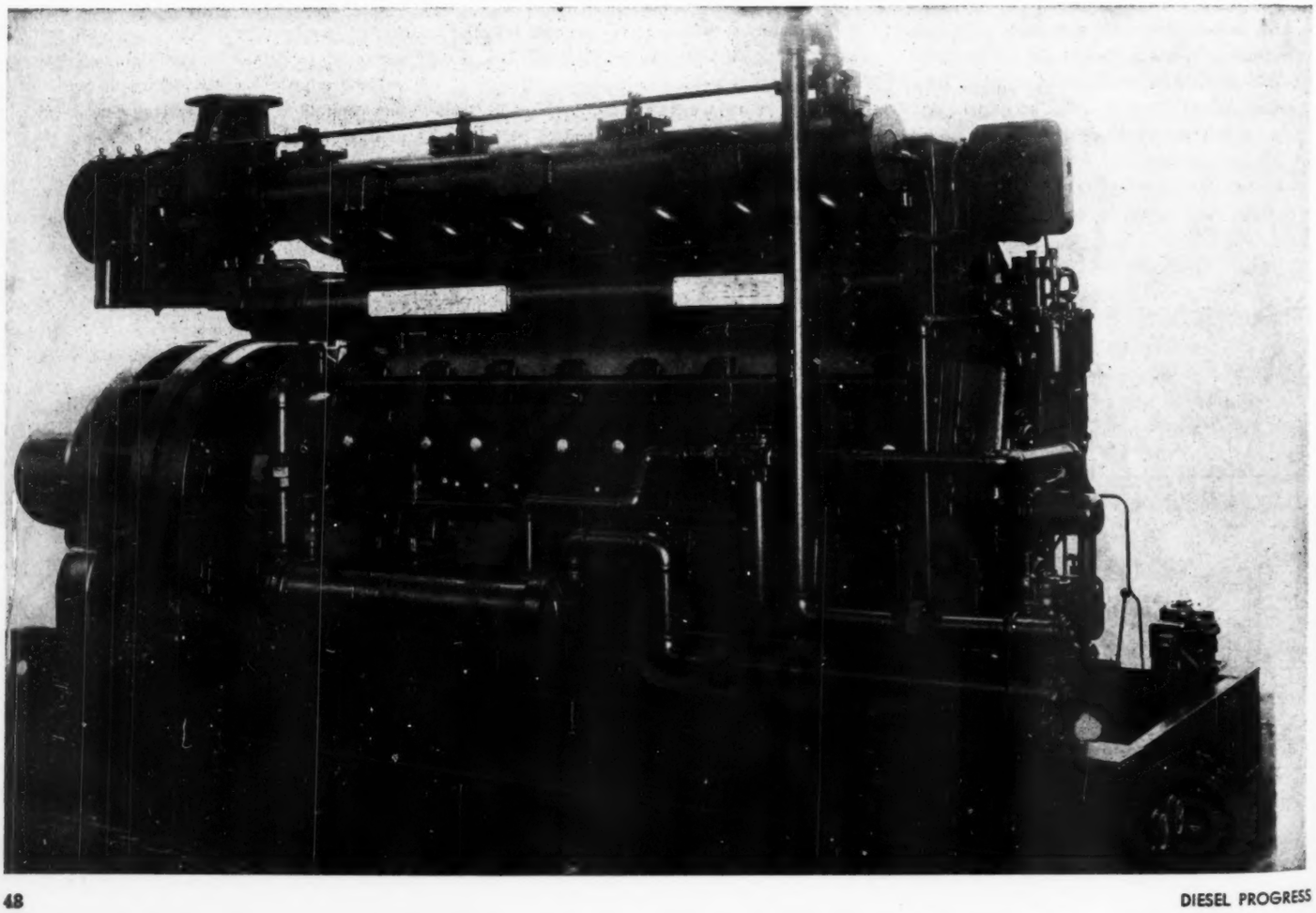
The outer shell of the water jacket (See Fig. 2) made of 10 inch standard pipe, split in halves lengthwise, is then welded in place together with the necessary castings and bosses for clean-cut openings and water and pyrometer connections.

After all welding is completed the manifold is again given a physical dimension check and necessary correction measures taken, generally by application of heat with a torch. The water jacket of the manifold is then tested hydrostatically and stress relieved at 1150° F. for one hour, after which all loose scale is blown out by compressed air.

In the manufacture of the manifold, care is taken that all material used is of plain carbon steel with a carbon content below 30 to insure ideal welding conditions without special precautions.

This is the first of several articles describing the use of welded construction for Diesel Engines.—Editor's note.

Helixhaust manifold shown mounted on Superior Diesel engine and connected to Elliott-Buchi turbocharger.



DIESEL DEPRECIATION . . . a case study

By W. H. GOTTLIEB

"HOW many years will my Diesels last?" asks the prospective purchaser, trying to determine whether there is profit in supplying his own power requirements. His second question is "What will these Diesels save in operating costs over other types of power?" The two questions must be considered together if a rational analysis is to be made. The operating costs—fuel, lubricating oil, labor and maintenance are real, out-of-pocket expense as compared for instance with cost of purchased power, whereas a sinking fund, based on the probable life of the plant might be termed "bookkeeping" expense. In setting up a sinking fund to amortize the original investment the accrued interest on the fund should be considered as this will materially reduce the amount required. Thus a 20 year amortization does not require 5% per year but only 3.36% assuming interest at 4%. In many cases, the savings over other types of power permit writing off the original investment in a very few years although for bookkeeping and tax purposes a much longer time may be set up.

Ideally, the depreciation allowance should reflect wear and tear on equipment, obsolescence and residual value, but at best it is a vague and arbitrary calculation and the prospective purchaser should be careful to segregate it from his actual operating costs and resultant savings as compared with other forms of power.

In practice, we find Diesel life estimates all the way from 10 years by a Pennsylvania manufacturer, anxious to charge off his equipment in high profit, high tax years, to 50 years by an REA engineer, equally anxious to hold down the book cost per kilowatt-hour. Oberlin, Ohio, planned to write off their Diesels in about 14 years.

The problem is academic and conclusions are impossible as long as we confine our investigations to ledgers in the city clerk's office. It should be instructive to take an actual look at some Diesels that the bookkeeper says are ready for the scrap-heap. The smooth roar of engines at work and a pile of yellowing operating records should add some vital facts to the story of Diesel life and efficiency. Oberlin is a good subject for a study of this nature because the three Fairbanks-Morse Model 33D Diesels that went into operation in July, 1934, are now in their fourteenth year of service, and 14 is the magic number Oberlin has set for the complete depreciation of its equipment.

The pertinent questions are: 1. What have these Diesels done in the past 13 and a fraction years, their "official" lifetime? 2. Has their operation been profitable to the communal owners? 3. What is their present condition? Is their useful life really over or was the town too conservative in its estimate of Diesel durability?

The original plant, designed to improve Oberlin's electric service and reduce electric rates, consisted of one 600 hp. Fairbanks-Morse Diesel driving directly at 400 rpm. a 415 kw. F-M alternator with direct-connected exciter, and two 875 hp. Fairbanks-Morse Diesels which deliver their rated horsepower at 300 rpm. and are direct-connected to 606 kw. F-M alternators, also with direct-connected exciters. These three units carried the entire load until 1941 and the rapidly expanding demand very nearly outstripped plant capacity. Help arrived in 1941 in the form of a 1400 hp. Model 33E16, 300 rpm. Fairbanks-Morse Diesel with direct-driven 981 kw. F-M alternator.

Question No. 1: What Has The Plant Done?

This four-engine plant had generated 58,564,200 kw. hrs. by the end of August, 1947. These four Diesels had run a total of 150,471 engine hours by that date, with the older units accounting for the bulk of the running time. In all those years of operation, there was only one occasion on which engine failure caused the plant to drop its load—and that plant outage lasted just 10 minutes. Fuel consumption is a ready gauge of plant efficiency and this plant produced 11.98 kw. hrs. per gallon of fuel for the entire period of more than 13 years. Table I gives the full operating picture for the life of the plant, with kilowatt-hours generated, fuel and lube consumed, hours operated, and peak loads carried. What have the engines done? The answer seems to be a record of large production with good efficiency, and of long service with impressive dependability.

Question No. 2: Was It Profitable?

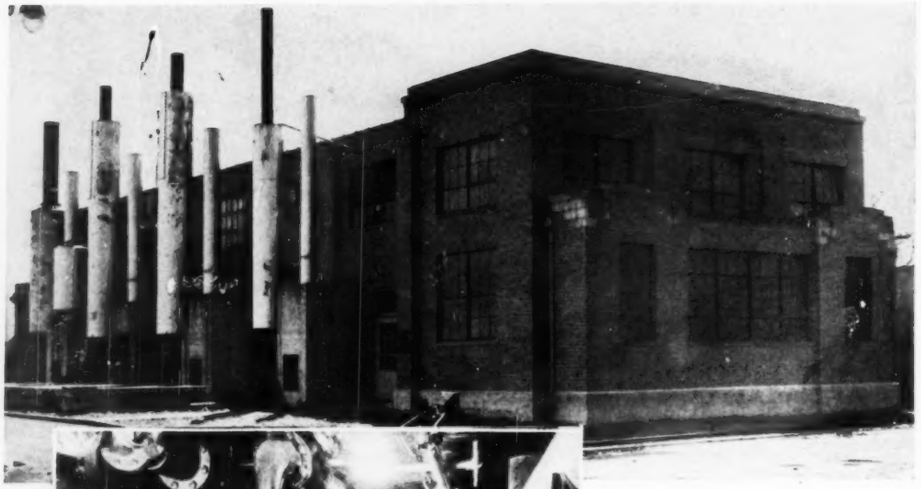
The second question concerns the municipal need for economical power production to permit low electric rates. The residential rate under the old schedule was 8 cents per kw. hr. for the first 30, 6 cents per kw. hr. for the next 60, and 3 cents for each unit over 90. The current municipal rate starts at 5 cents per kw. hr. for the first 20, 4 cents for the next 30, 3.5 cents for the next 150, 3 cents for the next 800, and 2.5 for all over 1000. Cooking and heating rates drop quickly from 5 cents for the first 15 to 2.25 cents for the next 185, and just 1 cent a kw. hr. for all over 200. In addition, it has been the practice to give away one month's service as an annual bonus.

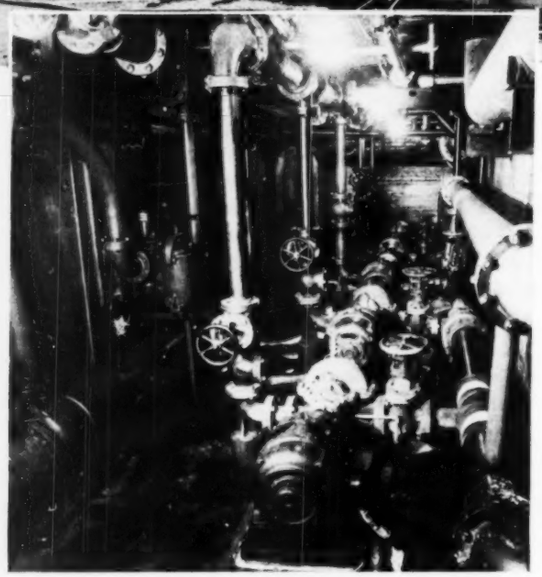
Although Oberlin consumers pay only an average of slightly over 3 cents per kw. hr., the electric department shows profits totalling well over $500,000 for the life of the plant. In the five years ending Dec. 31, 1946, this municipal department showed a net profit of $294,863.37. Here is the financial position at the close of 1946: *(Over)*

TABLE I.

Year	Kw. Hrs. Generated	Fuel Oil Consumed	Lube Oil Consumed	Kw. Hrs. Gal. Fuel	Per Peak Load	Engine (kw) Hours
1935	2,443,400	222,430	4,291	10.9	780	8,953
1936	2,760,700	240,330	2,722	11.48	830	9,580
1937	3,069,500	270,960	3,171	11.3	1020	9,595
1938	3,945,300	321,430	3,988	12.2	1210	12,571
1939	4,211,400	333,680	3,381	12.62	1365	10,343
1940	4,542,100	362,620	4,327	12.52	1410	11,752
1941	4,820,800	391,690	4,444	12.3	1485	12,653
1942	4,841,500	409,890	5,455	11.8	1420	12,358
1943	5,025,300	415,710	5,334	12.0	1450	11,546
1944	5,543,800	460,500	5,707	12.0	1485	12,984
1945	5,778,500	485,180	5,653	11.7	1750	13,245
1946	6,784,800	569,590	6,635	11.9	2140	14,664
1947 Eight Mos.	4,797,100	401,830	4,118	11.9	1975	10,227
TOTALS	58,564,200	4,886,840	59,226	11.98	2140	150,471

(NOTE: 1935 figures include plant's initial production in 1934)

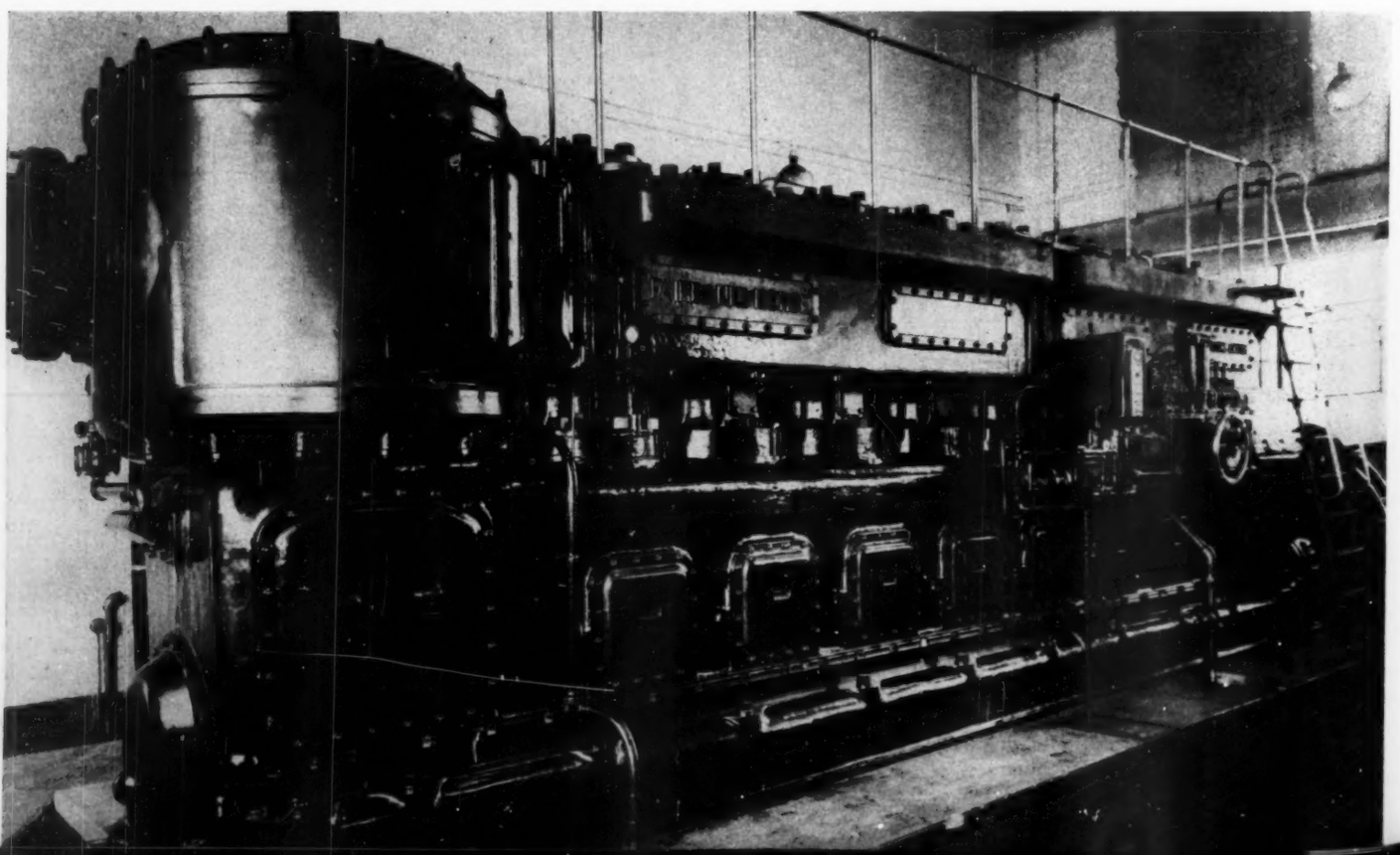




Rear view of Oberlin Ohio municipal power plant showing American air filters in concrete housings, three Maxim exhaust silencers. At left end of building is a Burgess intake air snubber and exhaust snubber.

Cooling water is handled by these five motor driven F-M pumps, two for jacket water, two for raw water, and one as standby. At left is a Schutte & Koerting lube oil cooler.

Plant's newest engine is this 1,400 hp. Fairbanks-Morse Diesel. Preparations are being made, however, to install a new 1,600 F-M opposed piston engine.



Cash on hand	$ 44,859.05
Investments (mostly U.S. Gov't bonds)	116,605.00
TOTAL Liquid Assets	161,464.05
Indebtedness (Remaining bonds for original plant and plant expansion)	$ 54,000.00

Thus, with the $262,900.42 power plant completely paid for, the town still has on hand a clear net profit of $107,464.05. The answer to attractive profits at low selling price is inevitably low cost of production. Diesel generating costs at Oberlin have been as low as 7.65 mils per kw. hr.

Has Diesel operation been profitable to the communal owners? First, these owner-consumers have made important savings in amount they pay for electric service. Second, their electric department has a clear unencumbered profit of more than $107,000 in the bank.

Question No. 3: What Is Plant's Condition?

The third question gets to the meat of the depreciation problem. What is the present condition of the old engines and what can we expect from them now that the bookkeeper has given them up? Actually, a Diesel that is properly maintained does not deteriorate. Efficient operation of good equipment keeps wear to a minimum and finally, when necessary, parts that wear can be replaced. At Oberlin we find that kw. hr. production per gallon of fuel for the most recent period for which figures are available was 11.93, virtually as good as the 13-year average. In the months when load conditions were favorable, the return for fuel was as high as 12.2. These figures for the first eight months of 1947 show no evidence of engine deterioration.

Frank Craig, who has been Superintendent of the

plant since 1935, believes in an orderly maintenance program designed to keep his Diesels at new-engine efficiency. Each unit is given a thorough check every 6000 hours of operation and careful records are kept of the condition of every piston, cylinder and bearing. Here is the rate of cylinder wear for the three original engines as revealed by the most recent inspections:

Engine No. 1 .....0.00033 in. per 1,000 hours.
Engine No. 2 .....0.00013 in. per 1,000 hours.
Engine No. 3 .....0.00040 in. per 1,000 hours.

Needless to say, no cylinders have been rebored and no replacement or reboring is anticipated for many years. Cook piston rings are now used on all the engines and there have been only two broken rings in more than 110,000 hours of operation. Main bearing replacement has been thought necessary on one engine, but on connecting rod bearing has ever been replaced. Maximum crankshaft wear at the rod bearings is just 0.0005 in. for the life of the plant.

Results such as these are achieved through choice of heavy-duty prime movers and good protective accessories. Marathon lubricating oil is circulated through each engine by a positive-action pressure system and, since the oil is used to cool the pistons, is channeled through oil coolers, a Schutte & Koerting for each of the first three engines and a Sims for No. 4. In addition to a constant mechanical filtration, the lube oil is pumped from the engine every two months and cleaned in a Hilco activated clay oil purifier.

A closed cooling water system furthers the scheme of protection. Actually both "raw" and jacket water are treated with softening compounds, a D. W. Haering Co. chemical for the raw and a Dearborn Chemical Co. compound for the jacket. Frequent tests are made to determine the color and alkalinity of the water. Jacket water is circulated by a pair of 4 in. motor-driven Fairbanks-Morse centrifugal pumps from a hot well through the engines and the tubes of two Schutte & Koerting and one Sims heat exchangers. A second pair of F-M centrifugals puts raw water through the exchanger shells and out to a Cooling Tower Company atmospheric type tower. A fifth pump serves as a standby for both systems. For emergency use, there is a connection to the city water. Fuel oil is unloaded from tank cars by a Roper rotary pump into three 10,000 gal. storage tanks, whence it flows by gravity through Niagara meters to individual 750 gal. day tanks in the plant basement. Engine-driven supply pumps pick up the fuel and put it through duplex Nugent pressure filters before it reaches the engine injection system. Each engine is equipped with a Woodward Type IC governor to regulate fuel injection.

The last avenue for contamination of the Diesels is blocked by impingement-type American air filters which insure a supply of clean air for the engine scavenging air pumps. Air for No. 4 also passes through a Burgess snubber. There is another Burgess snubber for No. 4's exhaust gases; the other three engines are fitted with Maxim exhaust silencers.

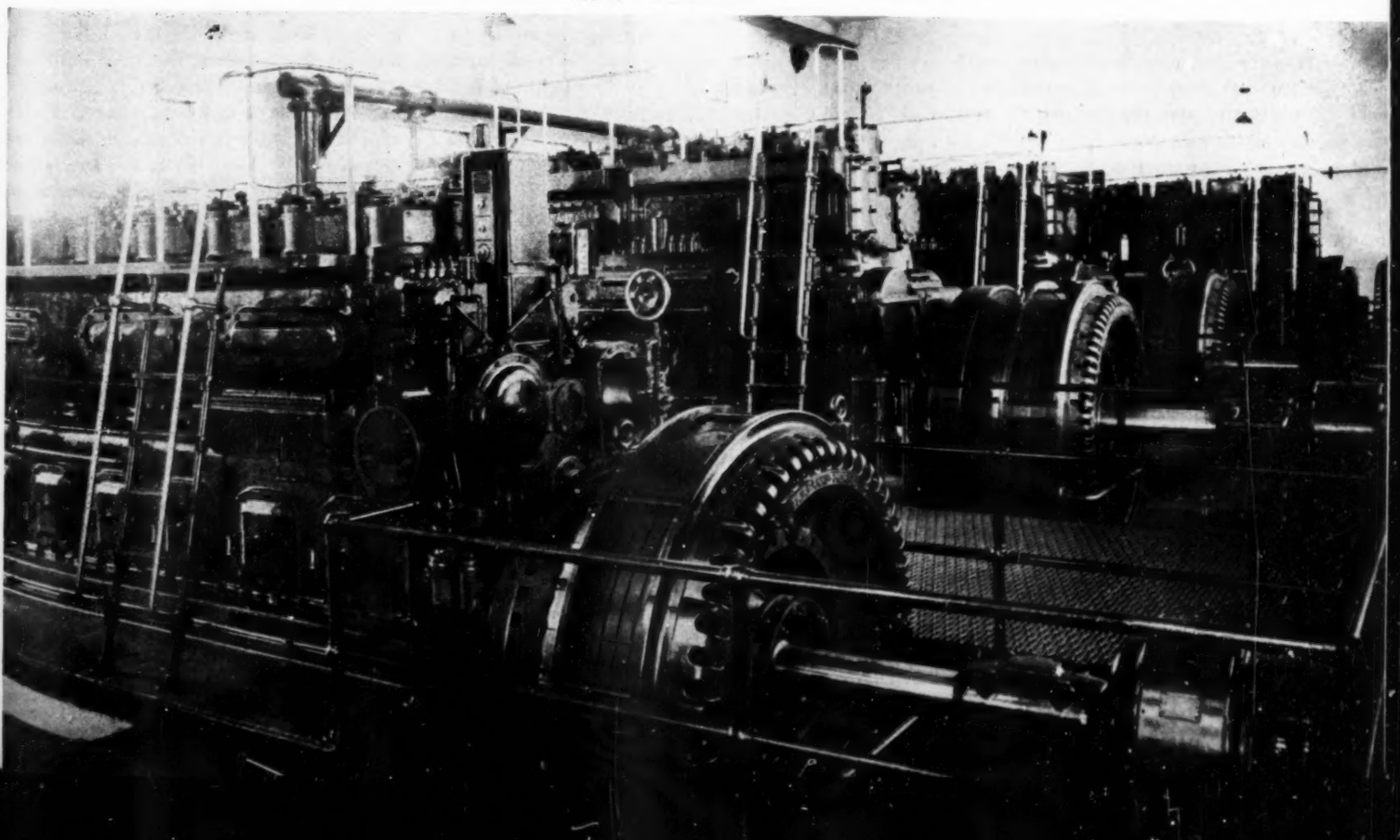
A Fairbanks-Morse alarm panel carries an Alnor multi-point exhaust pyrometer and Marshalltown pressure gauges for scavenging air, lube oil, raw water, and jacket water. An alarm sounds if any pressure goes outside the predetermined limits. There is a separate similar panel for the No. 4 engine. Starting air for the Diesels is supplied by either a Gardner-Denver motor-driven compressor or a Fairbanks-Morse compressor.

Oberlin is primarily a college town and all municipal services are geared to the special needs and problems of Oberlin College. In recent years the school has expanded its important work in scientific research and the laboratories demand not merely an unfailing electric supply but also an unusually steady frequency. To meet this need, the plant installed a Leeds and Northrup automatic frequency control panel and as a result the electric clocks at Oberlin do not vary as much as ¼ of a second in 24 hours. The Westinghouse switchboard is specially well equipped, with Westinghouse vibrating-contact voltage regulators, switches, over-current relays, watt-hour meters, and recording kilowatt meter, an Esterline-Angus recording voltmeter, and a Leeds and Northrup recording cycle meter.

What Are The Conclusions?

Well, then, what are the prospects for this power plant? Are the engines ready for the junk heap? Obviously not. It is evident that the Diesels are rendering service equivalent in efficiency and economy to their new engine performance. With continued operating care and maintenance of the kind they have been receiving, there is no reason to doubt that they can continue power output at undiminished efficiency for many more years. It is clear that 14 years is much too short a life expectancy for well designed, properly applied and carefully operated Diesels.

These four Fairbanks-Morse Diesels with a combined capacity of 3,750 hp have generated 58,564,200 kwh. View shows the Woodward governors, Nugent fuel filters, and Madison-Kipp cylinder lubricators.



EUROPEAN MOTORSHIP DEVELOPMENT

PART TWO

By A. P. CHALKLEY, Editor of "The British Motor Ship"

Editor's Note: We are privileged to present the text of A. P. Chalkley's recent address to the Diesel Engine Panel of the recent Marine Conference held in New York. Speaking under the sponsorship of the Diesel Engine Manufacturers Association, Mr. Chalkley built up an impressive case in favor of the Diesel-propelled ship. His paper, published in two parts, is concluded with this issue.

TYPES of European Motor Ships. The war occasioned a loss of about 18,000,000 tons gross or 27,000,000 tons deadweight to European merchant shipping (exclusive of Germany and Italy), and a substantial proportion of this will have to be replaced by new tonnage. In view of the need for rebuilding merchant fleets as quickly as possible, and at the lowest cost, it might appear that there was a Heaven-sent opportunity for standardization on a large scale such as had not previously been dreamed of in the history of European shipping. Individual British owners, in some cases, lost 50 ships or more, and if ever a case could be made out for general standardization it existed when war concluded. Yet, on the whole, comparatively little progress has been made in this direction, apart from the building of tankers, and very seldom is an owner willing to adopt a type of cargo ship precisely similar to that being built for another shipping company.

Even in cases where individual owners have to acquire as many as 50 ships in order to bring their fleets up to pre-war level, the number of new vessels built to one design is small, but it is, in some instances, certainly greater than would have been considered reasonable in pre-war days. For instance, the Blue Funnel Line is building 12 precisely similar motor cargo ships, and in a more specialized field, the New Zealand Shipping Co. is constructing eight large standard, fast, refrigerated cargo motor vessels.

It is not only the much advertised individualism of the European, and particularly the British shipowner, and his insistence on the need for specially built ships based upon long experience, that is the cause of this apparent indifference to the advantages of standardization. It is found that the saving in cost, and the economy in time of building are by no means so great as might be thought, at any rate, under conditions of European construction. Whether this is lack of will or interest, or whether it is an inherent factor in European shipbuilding, is not easy to determine. At any rate, the net result is that we need not anticipate that shipbuilding in Europe will ever become a standardized process, since no advantage has been taken of the best possible opportunity that could ever arise. To this, however, the exception must be made of tanker building in Britain, a matter which will be mentioned later. A certain type of "economy" motor ship developed by Doxfords before the war may also be considered as an approach to standardization on a wider scale, but even this development has been overshadowed since the war by the building of more specialized ships.

The large majority of motor cargo liners now being built are designed for a speed of between 15 and 17 knots. Two Swedish companies, however, the Johnson Line and the Transatlantic Lines, which, like the majority of European motor cargo liner owners, have gradually stepped up the speeds of their ships from 12 knots to the present-day figures, have laid down new tonnage which will be capable of maintaining 19½ knots to 20 knots at sea. Several of these ships will be in service within the course of the next few months, and they represent a movement at which some owners look askance, in view of the high cost of construction and the relatively heavy fuel bill (the consumption will be about 50 tons daily for full speed). There are, however, many shipowners who consider that it will be necessary to provide such speeds on certain routes in the future, although it is a corollary that long delays in loading and discharging at ports must be avoided, if advantage is to be gained by the high speed at sea.

Tramp ships figure to a negligible degree in post-war British and Continental construction. Most of the tramp owners are endeavoring to carry out their trades with such of their ships as were not destroyed during the war, (about 50 per cent were lost) together with vessels purchased from America and the war-built ships constructed for the British Ministry of Transport. Generally speaking, tramp owners refuse to contract for new tonnage at present-day prices, which, they consider, will fall in a year or two. In any event, it seems doubtful whether there will be a field for tramp tonnage to the same extent and of the same type as existed before the war. It is believed, in many quarters, that faster vessels will be used and in any event, coal-firing is eliminated and tramps with oil-fired boilers and geared turbine machinery hardly come into question.

The future tramp, therefore, is likely to be a 12-knot or possibly even a 13-knot Diesel-engined ship, and if the old-time tramp owner holds up his hands in horror at the thought of such high speeds and such relatively expensive vessels, then the answer is that demand may force him to take this revolutionary step. Already the forerunners of such ships are in service and one or two 14-knot motor vessels intended for the tramp trade have made their appearance.

The relatively large volume of refrigerated cargo vessels now building represent types that are practically similar to pre-war designs without any major alterations. The majority of these vessels, all built in Britain, are motor ships, involving in some cases, twin-screw machinery up to 13,500 bhp. The long voyages upon which most of them are engaged give the Diesel engine a considerable advantage, not only in regard to the fuel bill but in deadweight capacity, and most owners are continuing their pre-war policy of employing Diesel engines exclusively. In one or two cases, however, as for instance, the Blue Star Line, both steamers and motor ships have been ordered, but it is probable that questions of delivery dates had some influence.

A type of ship which has made great headway in Europe only since the coming of the Diesel engine, is the relatively small, fast, fruit ship, usually with a certain amount of passenger accommodation. Before the war, a substantial number of these ships of about 3,000 tons deadweight with a service speed of 17 knots was built. They proved extremely profitable and, at present, some 30 are on order, practically all for Scandinavian owners, although a few are being built for France. With a fuel consumption of less than 20 tons daily for a loaded speed of 17 knots, they are able to make long voyages without rebunkering, and yet carry sufficient deadweight capacity to render the vessels profitable, even in times when only moderate cargoes are available, and when ships needing 8,000 or 9,000 tons to fill their cargo holds would find it difficult to make ends meet.

Tankers. Motor tanker construction in Europe, (the only steam tankers are a relatively small number for Britain and France) is characterized by the concentration in Britain on 9,000-ton and 12,000-ton, 12-knot ships, and in Scandinavia by 14-knot vessels ranging mainly from 15,000 tons to 17,500 tons deadweight. The reason lies in

the fact that the Scandinavian tankers are almost wholly built for chartering, for which trading the faster and larger ships are more favored, while the British vessels are constructed for the tanker-owning companies associated with, and controlled by, the large oil-producing companies who need the relatively small vessels for operating in the particular harbors where they have to work. It is thus found, for instance, that the 12,000-ton, 11½-knot motor tanker with machinery of about 3,600 bhp. represents a thoroughly economical and convenient ship for year in and year out services that are necessary. A sprinkling of 15,000 tonners is built, but when larger ships are required, these companies rely on tanker chartering from the Norwegian owners. Thus, in this field, standardization is possible and, as mentioned before, some 30 or 40 similar ships have been built or are building for the two leading oil-carrying companies in Britain.

If there had been any marked advantages in standardization on a large scale, it would have been reflected in the construction of tankers for Norwegian owners. In Sweden there are 48 tankers being built for Norway between 12,200 tons and 24,400 tons deadweight, and there are no fewer than 14 entirely different sizes.

While there has been little standardization of ships as a whole, however, there is very substantial standardization of machinery and the numbers of types of engines being built are small, while the complete engine-room installations are, in many cases, standardized in ships for different owners.

An entirely new development in European shipowning and shipbuilding since the war, and one with which the Diesel engine is wholly concerned, is the construction of much larger tankers than had previously been built. America is playing, perhaps, the main part in this activity since no doubt all the tankers will be chartered to American oil companies. They total 13, of which 10 are for Norwegians and each is of 23,000 tons deadweight capacity or over, the largest being a 27,000 tonner. None of the ships will have a speed of less than 14 knots—this appears to be almost a standard speed for Norwegian-owned tankers under present conditions—and a few will be designed for 14¾ knots.

The whale oil factory ship is the latest conquest of the Diesel engine. Before the war, except for two vessels of this class, all were steamers, and steam machinery possesses the advantage that all the process steam required for the factory is readily available. Several new ships have, however, been ordered and all are to be propelled by Diesel machinery which is utilized because of the saving in the fuel bill and the increased carrying capacity. In their way, they are as important as passenger ships with their cost of about £2,000,000 and accommodation for a crew of 300 to 400.

Trend of European Diesel Machinery Development. It was many years after the motor ship had first made an impression upon ocean shipping that the position of the four-stroke Diesel engine as a propulsive unit was seriously challenged, and even in the early 1930's, more than half of the ships being built were equipped with this type. The two-stroke single-acting engine has steadily grown in favor until, at present, about 84 per cent of the ships on order are to be propelled by this design of Diesel engine. Particulars are not available of all ships under contract, but out of a total of 661 of which details are known, 542 are to have two-stroke single-acting engines. The details of the machinery for ships under contract are shown in Table IX.

TABLE IX

Machinery in Motor Ships Now on Order

Type of Engine	No. of Ships	B.H.P.	Average B.H.P.
Four-stroke	28	105,100	3,750
Two-stroke, single-acting	542	2,601,200	4,800
Two-stroke, double-acting	91	668,700	7,300
	661	3,375,000	5,100

Corresponding particulars for the motor vessels constructed in 1938 are given in Table X, and Table XI indicates the changes which have taken palce since 1931. It is probable that the present tendencies will be maintained or even become accentuated.

TABLE X

Machinery in Ships Built in 1938

Type of Engine	No. of Ships	Total B.H.P.	Average B.H.P.
Four-stroke	46	153,000	3,350
Two-stroke single-acting	111	445,000	4,000
Two-stroke double-acting	61	422,000	6,900
	218	1,020,000	4,700

TABLE XI

Types of Machinery

Type	Ships Completed in 1931	Ships Completed in 1938	Ships now on Order
Four-stroke	95	46	28
Two-stroke single-acting	70	111	542
Two-stroke double-acting	10	66	91
	175	223	661

At one time it seemed possible that the double-acting two-stroke type would approach the single-acting design in popularity, but the tendency is now all in the other direction. There are several reasons. Ease of overhaul and maintenance are more important factors than ever before because of the present need to ease the work of seagoing engineers, and from this standpoint, the single-acting engine obviously has a substantial advantage. Upkeep costs are lower and it is no longer necessary to adopt the double-acting principle in order to attain the powers needed in modern motor ships. Most manufacturers now build a standard single-acting engine with an output of at least 1,000 bhp. per cylinder, and few double-acting designs go beyond this power. It is generally considered also that the single-acting design scores in reliability over the double-acting type.

The extent to which the various types of Diesel engines are being installed in European-built motor ships is indicated in Table XII. The figures do not represent all of the motor ships now on order, but the majority of them, the particulars of the remainder not being available.

TABLE XII

	No. of Ships	B.H.P.
Doxford single-acting two-stroke	156	899,200
B. & W. Single-acting two-stroke 159 ships of 637,700 B.H.P.		
Double-acting two-stroke 25 ships of 177,800 B.H.P.		
four-stroke 21 ships of 71,600 B.H.P.		
Total	205	887,100
Sulzer single-acting two stroke	90	511,600
Gotaverken single-acting two stroke	65	381,100
M.A.N. single- acting two-stroke 10 ships of 55,400 B.H.P.		
double-acting two-stroke 43 ships of 303,400 B.H.P.		
Total	53	358,800
Fiat double-acting two-stroke	13	109,600
Stork double-acting two-stroke	10	79,900
Polar single-acting two-stroke	62	115,200
Werkspoor four-stroke	7	33,500
	661	3,376,000

Practically all of the Doxford engines are being built in the United Kingdom, except two or three in Holland. The Burmeister & Wain types are under construction in Great Britain, Denmark, France, Belgium and other countries; Sulzer engines are built in Switzerland, Britain, France and Belgium. The Gotaverken design is manufactured wholly by Gotaverken in Sweden and the M.A.N. type mainly by Kockums, Malmo, Sweden, a few engines being under construction in Holland and France. The Fiat is wholly Italian, the Stork is manufactured only in Holland and the Polar type in Sweden and the United Kingdom, while the Werkspoor type is built in Holland and Britain. No other engines are being constructed in Europe for ocean-going ships.

On the subject of rating of engines a great deal has been written and owners, their superintendent engineers and engine manufacturers sometimes take different views. Experience has shown that for various engines there is a brake mean effective pressure beyond which it is undesirable to operate if maximum efficiency, and particularly reliability, are to be obtained. If the engine builders give a rating which they consider to be a maximum continuous rating, most shipowners are content to operate their engines at not more than 85 per cent or, in some cases, 80 per cent of this rating in regular service. The exact figure depends a great deal upon the engineers in charge of the machinery and upon the trade on which the ship is engaged.

Details of typical double-acting and single-acting

. . . . *And now please turn to page 62* . . . .

SIX NEW DIESELS ROUND O

HERCULES Motors Corporation has completed the development of a number of engines the past year, both Diesel and gasoline, of particular interest to manufacturers of mobile equipment requiring prime movers.

In the Diesel class the company has added six models to its line. These engines, like the entire nine series and twenty-two models of Diesels it builds, are of the high speed, light weight, heavy duty type.

The Hercules Model DIX-6 is a small six cylinder Diesel with a 3⅝ in. bore and 4 in. stroke. This engine is capable of operating successfully at speeds up to 3000 rpm. The stripped engine develops 93 hp. and only weighs approximately 750 lbs. Because of its low weight, plus the fact that its over-all dimensions are approximately those of the gasoline engines of similar displacement, conversions can be readily made without fear of any compromise in performance.

The Hercules Model DIX-4 is a 4 cylinder Diesel engine that parallels the model DIX-6 as described above in design, performance features, and in its interchangeability with gasoline engines of similar power capacty. This four cylinder engine is built in two different bore sizes. The 3¼ in. bore and 4 in. stroke engine develops 46½ hp. at 3000 rpm. The 3⅝ in. bore and 4 in. stroke engine has a power output at 3000 rpm. of 57 hp. The stripped engines weigh approximately 600 lbs. Well balanced, counterweighted crankshafts supported in five main bearings insure smooth operation even at these comparatively high speeds.

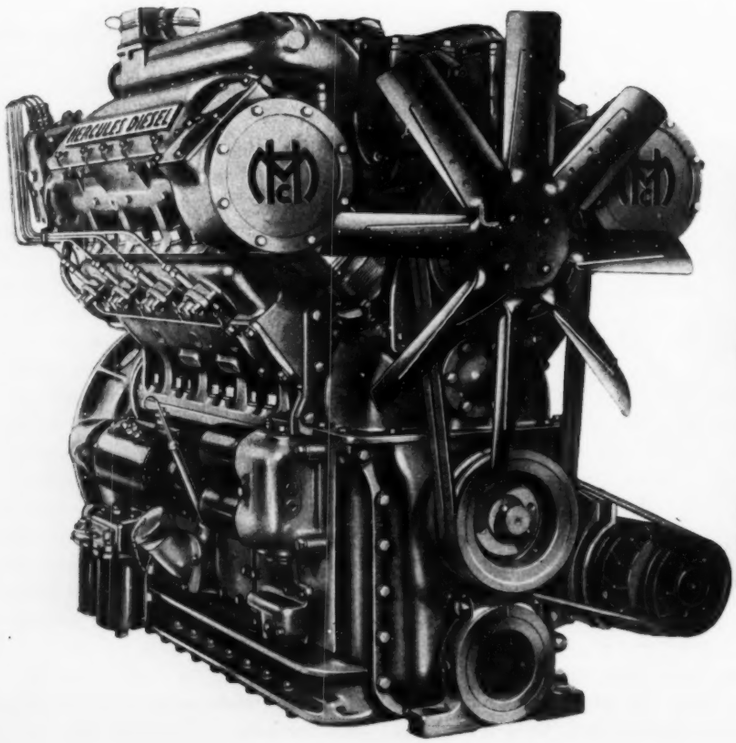
While Hercules Motors Corporation sensed the postwar trend for flat "pancake" type of engines as far back as 1938 for under-floor, "mid-ship" installation, and built a number of them since that time, it was not until the past year that the opportunity presented itself to round out the Hercules line. Three models of flat Diesel engines have now been developed.

The Hercules Model DJXHF horizontal engine develops 99 hp. maximum power at 2600 rpm. The stripped engine weighs approximately 900 lbs. The Hercules Model DWXLDF horizontal engine with 4½ in. bore and 5 in. stroke develops 142 hp. at 2600 rpm. Piston displacement is 426 inches. The stripped engine weighs approximately 1300 lbs. The Hercules Model DFXHF develops 260 hp. at 2100 rpm. The stripped engine weighs approximately 2600 lbs.

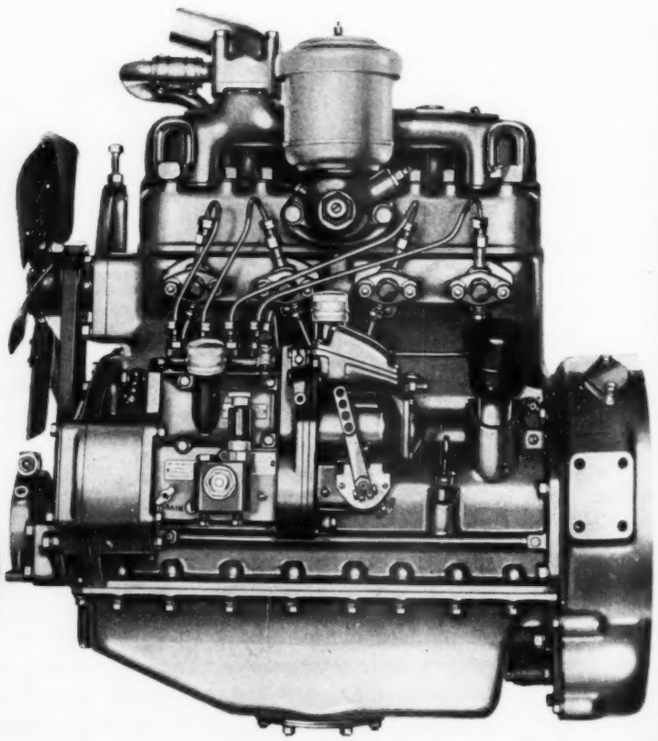
To make it possible for the company to cope with the ever increasing demand for Diesels for a rapidly growing list of diversified applications, Hercules Motors Corporation did not feel its job was done until, in addition to its two, four and six cylinder series, it could provide eight cylinder Diesels as well. As a result, the Model DNX-V8 was introduced last year and Hercules is now in a position to furnish a range of power in the Diesel class from 12 to 500 hp.

The Hercules DNX-V8 is a 45° V engine. It is not new to Hercules in the strict sense of the word since it is the commercial outgrowth of a 32 cylinder engine Hercules Motors Corporation built for the United States Navy during the war and which, at that time, went through exhaustive tests and proved sound in design, principal of

8-cylinder V-type Hercules Diesel built in 3 sizes develops 400 max. hp. at 2100 rpm in 6¼x6 cylinder size.



4-cylinder Model DIX-4 built in two bore sizes develops 57 hp. at 3000 rpm with 3⅝ x 4 inch cylinder size.



OUT HERCULES LINE

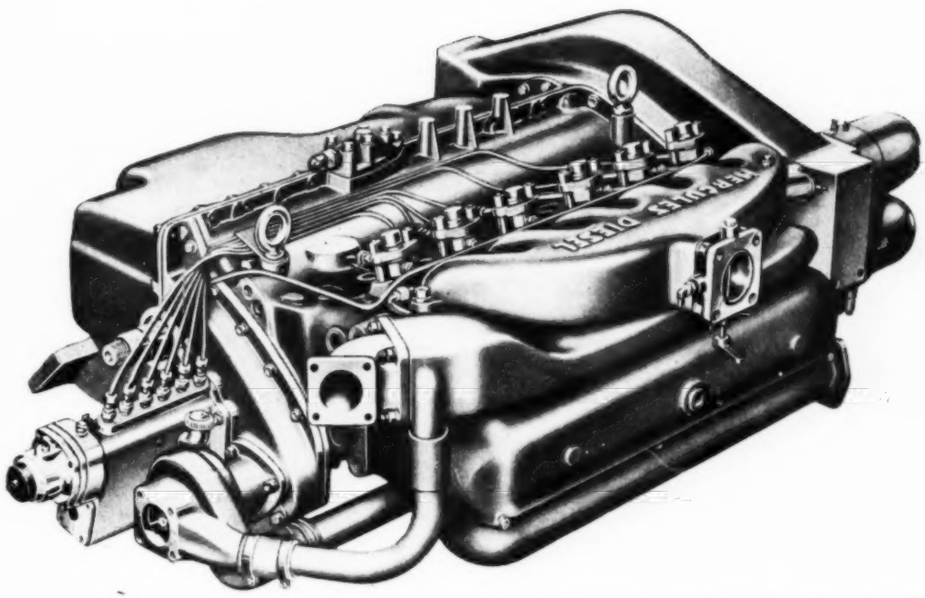
operation and construction. The Model DNX-V8 is built in three sizes:

The Hercules Model DNX-V8 Diesel is so compactly built that it measures up with the increasing demand for more powerful engines for automotive application as well as industrial and railroad applications where high speed, light weight, and maximum reliability are required. The stripped engine weighs approximately 4200 lbs. The over-all ength from the front of the fan blade to the rear of the bellhousing is only 56½ in.

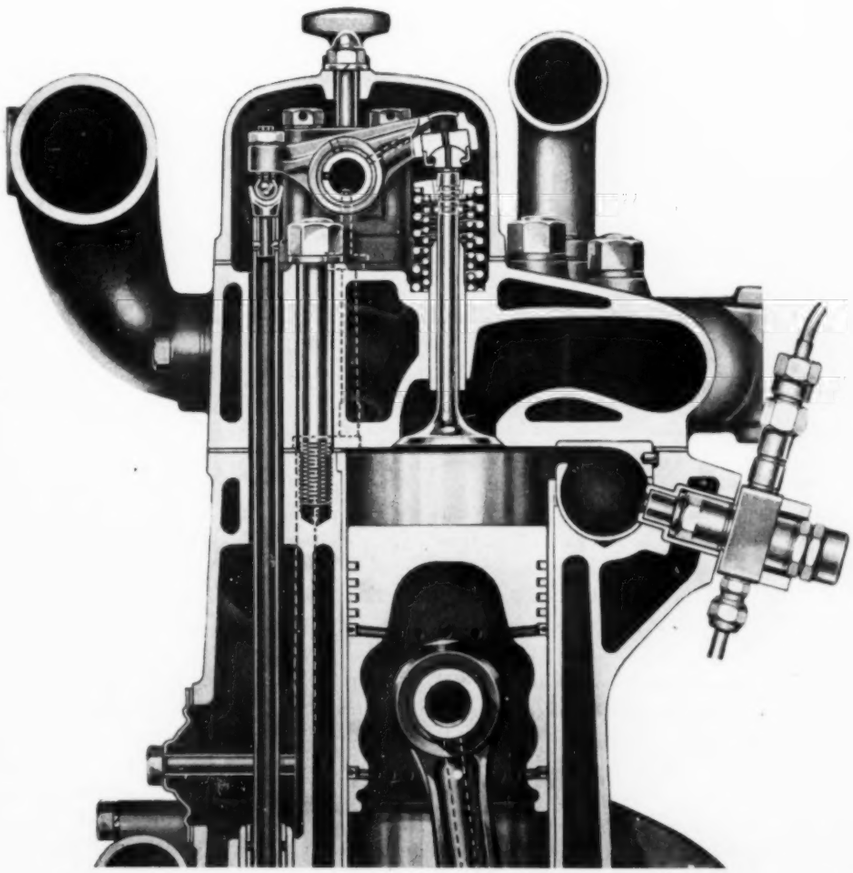
For special application where still more power is required, Hercules Motors Corporation is supercharging the Model DNX-V8. In doing this the company is drawing on its long experience during the last war when it built many thousands of super-charged engines for the United States Navy. The super-charged DNX-V8 develops 500 hp. at 2100 rpm. The super-charger on this engine is gear driven and is an integral part of the engine itself to achieve utmost reliability in performance plus compactness in design. The stripped engine weighs approximately 4600 lbs.

The patented Hercules combustion chamber safeguards operating efficiency. The Hercules combustion chamber is located at the side of the cylinder bore. During operation, as the piston proceeds to the end of its compression stroke, it passes across the passageway between the cylinder and the combustion chamber, thereby reducing its area and greatly increasing the velocity of the air passing into the combustion chamber.

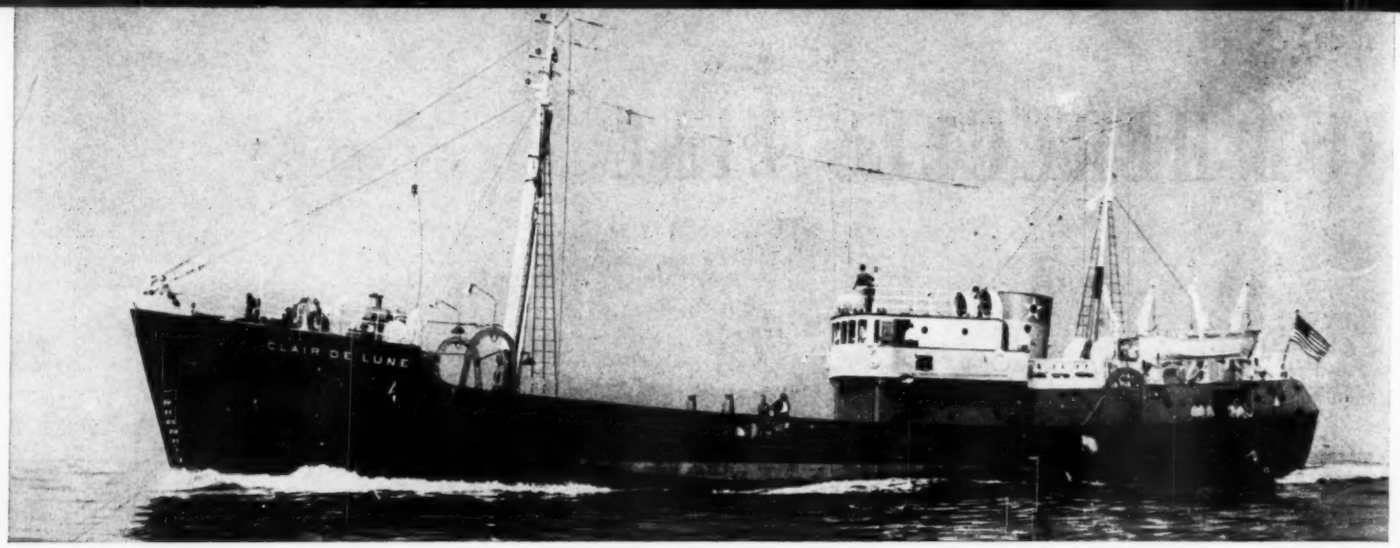
This velocity reaches its maximum just before the piston reaches the top of its compression stroke. At this time the air is moving at fifty times crankshaft speed—and into this swiftly revolving air the fuel is injected. In other words, in Hercules Diesel engines the all-important function of high turbulence is accelerated at the critical time of injection and combustion—completely mixing the fuel and oxygen. Furthermore, combustion is effected not only at the right time, but at the proper rate of burning—permitting the highest possible expansion of burned gases and resulting in exceptional thermal efficiency.



Hercules horizontal Diesel develops 142 hp. at 2600 rpm. has 4½ inch bore, 5-inch stroke.

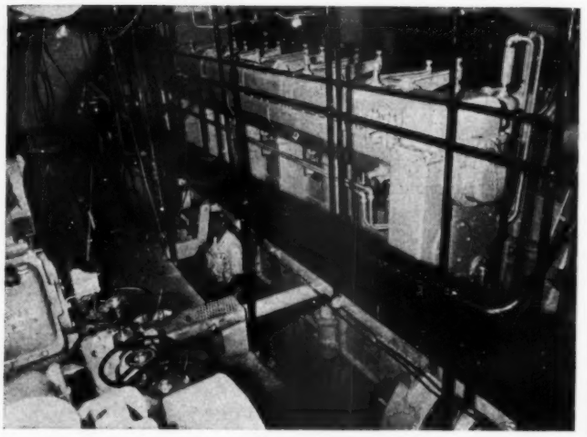


Sectional view of Hercules Diesel Engine showing patented Hercules Combustion chamber.



Clair De Lune, 152-foot French trawler, one of six such vessels building at Bath Iron Works.

Engine room view of trawler showing 750 hp. Baldwin Diesel which gives vessel an 11 knot sped.



152-foot Trawlers for French Fishing Industry

By DOUGLAS SHEARING

THE *Clair De Lune* and *Etoile du Sud* are on their way to Boulogne, Sur Mer, France, their home port, for the first time. Built by the Bath Iron Works and powered by Baldwin Diesels, these two ships are the first of six 152 foot trawlers to be delivered to French interests. They will be used by the French fishing industry to replace those vessels destroyed in World War II. These trawlers will fish for cod and herring and operations will be carried on from the African coast north to Iceland and Bear Island. Comparable in size and type of fishing gear to the larger vessels of the United States fishing industry, they have a greater operating range and will carry sufficient supplies to remain at sea for 40 days. The trawlers were designed by a French architect commissioned by the French Supply Council which placed the order, with the detail plans for building developed by Bath. The fish hold contains 11,300 cubic feet which will carry 147.6 long tons of 350,000 pounds total. The regular crew will number 20 men, including three officers and four engineers.

The vessels are well equipped in all respects. The main engine of each vessel is a Baldwin six cylinder, 750 hp., 200 rpm., turbo-supercharged Diesel equipped with direct reversing controls. It drives an eight-foot, ten-inch diameter, six-foot, two-inch pitch four blade, variable pitch propeller, and is capable of driving the vessel at a speed of 11 knots. For winch power two 6 cylinder Hendy Diesels are installed. These drive generators as all deck equipment is electrified. They are also used for ship's service power. An emergency Diesel generator developing 20 kw. at 1200 rpm. is also installed. It is a small General Motors Diesel–2 cylinder. A Gardner-Denver water cooled, 2-stage air compressor rated at 32 cfm. at 250 psi. supplies starting air to the Diesels. It absorbs 13½ hp. developing its rated output and is motor driven. Lube oil and water coolers are of Ross Heater manufacture.

The pumps aboard these vessels are of Worthington and DeLaval manufacture. The lube oil and fuel oil service pumps are DeLaval "Imo's" with 50 psi. discharge pressure for the former and 20 psi. discharge pressure for the latter. They are both powered with Diehl motors. The bilge and ballast pump is a Worthington 5X6 horizontal duplex power pump with a 135 gpm. capacity and a total net pressure of 85 psi. It also is driven by a Diehl motor at 1750 rpm. The general service pump is also a Worthington with the same specifications as above.

A Way Wolff, 270,000 btu. heating boiler, is installed which burns Diesel fuel. A DeLaval Unimatic lube oil purifier is also installed.

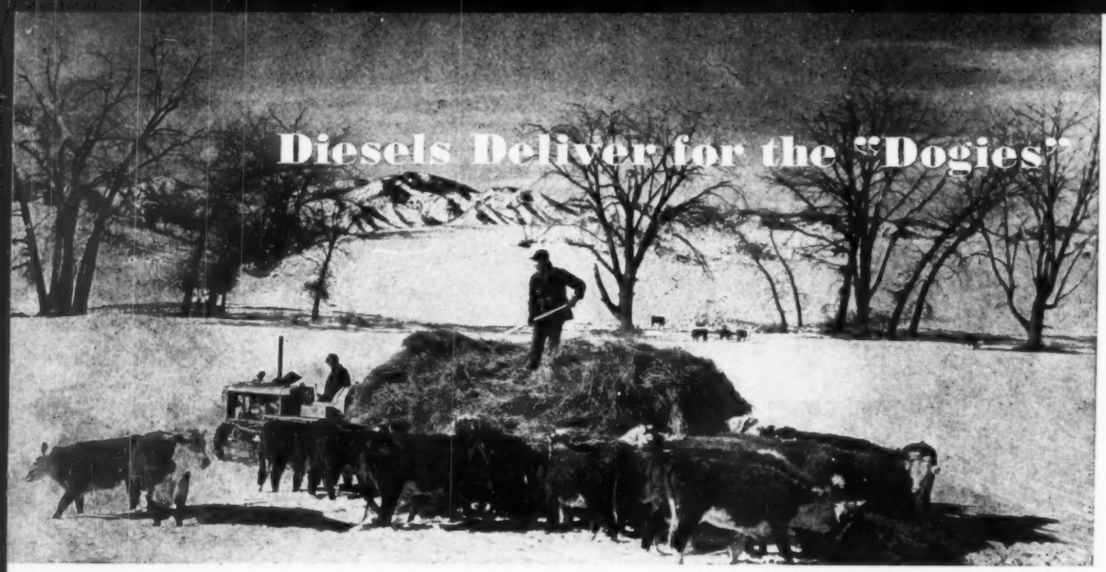
An emergency, hand operated air compressor developing up to 450 psi. Maxim silencers are installed on the main engine.

The trawlers are equipped with two radio transmitters and receivers and are also fitted with radio direction finding gear.

The vessels are of all-steel construction with riveted shell and frames and with plates welded. The fresh water tanks are locatd forward and the fuel oil tanks amidships. The total fuel oil capacity of the vessels is 32,380 gallons, which will insure long voyages.

Baldwin has completed delivery of the last of the six engines originally ordered and the remaining four trawlers will soon be ready to join the *Clair De Lune* and the *Etoile Du Sud* on the fishing grounds.

Diesels Deliver for the "Dogies"



Out on range cattle feed was delivered by Caterpillar Diesel Tractor during the '46 blizzard.

When Blizzards Come on the Range, Big Crawler Tractors Save Livestock

By F. HAL HIGGINS

THE American frontier is still plenty rugged when you get out west of the Missouri River and off the main highways that are kept open in winter by skilled crews of highway maintenance men on Diesel-powered tractors and snow plows. As one ranch woman put it when seen in the Sand Hills of Nebraska by the writer last year, "Yes, it does get mighty lonesome here sometimes when you don't dare let go the pump handle or you're lost in a blizzard!"

At Denver, capital city of both Colorado and the great Rocky Mountain empire of range beef and lamb, Diesel dealers know just how important their products are to live stock ranchers from years of cold experience. Thanks to the Diesel tractors on ranches and in the hands of state and county highway departments, however, the losses are not as staggering as they once were in the pre-tractor days when no one did anything about the weather except wish and hope. Not every farm and ranch has a Diesel crawler tractor, but most of those with cattle or sheep either have one or more or plan to get such a piece of indispenable equipment at the earliest possible day it can be delivered. In the words of the magazine TIME following the early November blizzard of 1946, "A crawler tractor with bulldozer was worth its weight in gold" in getting a ranch and its herds and flocks dug out of the snow and fed and watered or marketed by railroad.

The International Harvester branch house at Denver had considerable data on its dealers and the place of International Diesel tractors in that 1946 blizzard, the writer found, when he stopped in to visit and check on the tremendous values put on Diesel-powered crawler tractors at the time of the early 1946 blizzard. "We have reports from dealers throughout the blizzard areas," said the officials as they dug through files in search of certain pictures that proved the International was in the battle doing a herculean job of saving potential beef steaks, lamb chops, milk, butter, eggs and Thanksgiving turkeys. "But look at this TD9 pulling a beet harvester through the snow as our beet farmers worked to save their sugar crop," exclaimed the IH manager.

Sure enough, there was an International beet harvester being pulled through the beet field covered with snow as it handled a machine that wheel tractors couldn't do anything with under the wet and snowy conditions. That early snow had buried the Colorado sugar feet, cattle and sheep areas and then froze after a warm thaw that left a hard, deep crust over the fields all winter long. The best crop had to be harvested all through the winter under the worst possible conditions.

The Allis-Chalmers and Cletrac Diesel tractors, while not as numerous on farms as Internationals and Caterpillars, also were on the job and performed in spectacular manner to add glory to the Diesel engine's growing reputation. The Denver dealers had heard that every Crawler Diesel had done a hero's work after the storm.

In talking with the editor of Western Live Stock in Denver, whose staff was on the job and saw what was happening at the time of the blizzard, he said, "The week of blizzards and cold weather that plagued the eastern Rocky Mountains area during the week and a half of November marooned 30,000 cattle in southeastern Colorado, snowbound scores of ranches, cut down attendance at sales of purebreds and made the publishing of the WESTERN LIVESTOCK a touch-and-go job.

"Fate of the cattle stalled deeper than belly-deep in the extremely heavy snow in southeastern Colorado was still undetermined at press time. A drop in temperature, it was feared, would cause heavy losses in spite of emergency feed dropped by airplane. Large numbers of horses and sheep were also caught but were reported to be in less danger than the cattle. Aircraft and army vehicles also went on food dropping missions over numerous snowbound ranches in the storm-struck area."

Caterpillar Tractor dealers also found many of their ranchers saved the cost of their D2s, D4s and D6s many times over. Out 10 miles west of Denver is the Highlands Ranch of L. C. Phipps Jr., with 1100 beautiful baby beeves putting on weight daily as they were pointed for the market to meet the demands of a hungry world. The Diesel crawler daily pulled sled loads of hay out over the deep ice-bound drifts to keep the white-faces fattening without missing a meal. Thousands of head of cattle and sheep were perishing all over the Colorado range at the time because of the deep, hard snow blanket that could not be penetrated by live stock for forage.

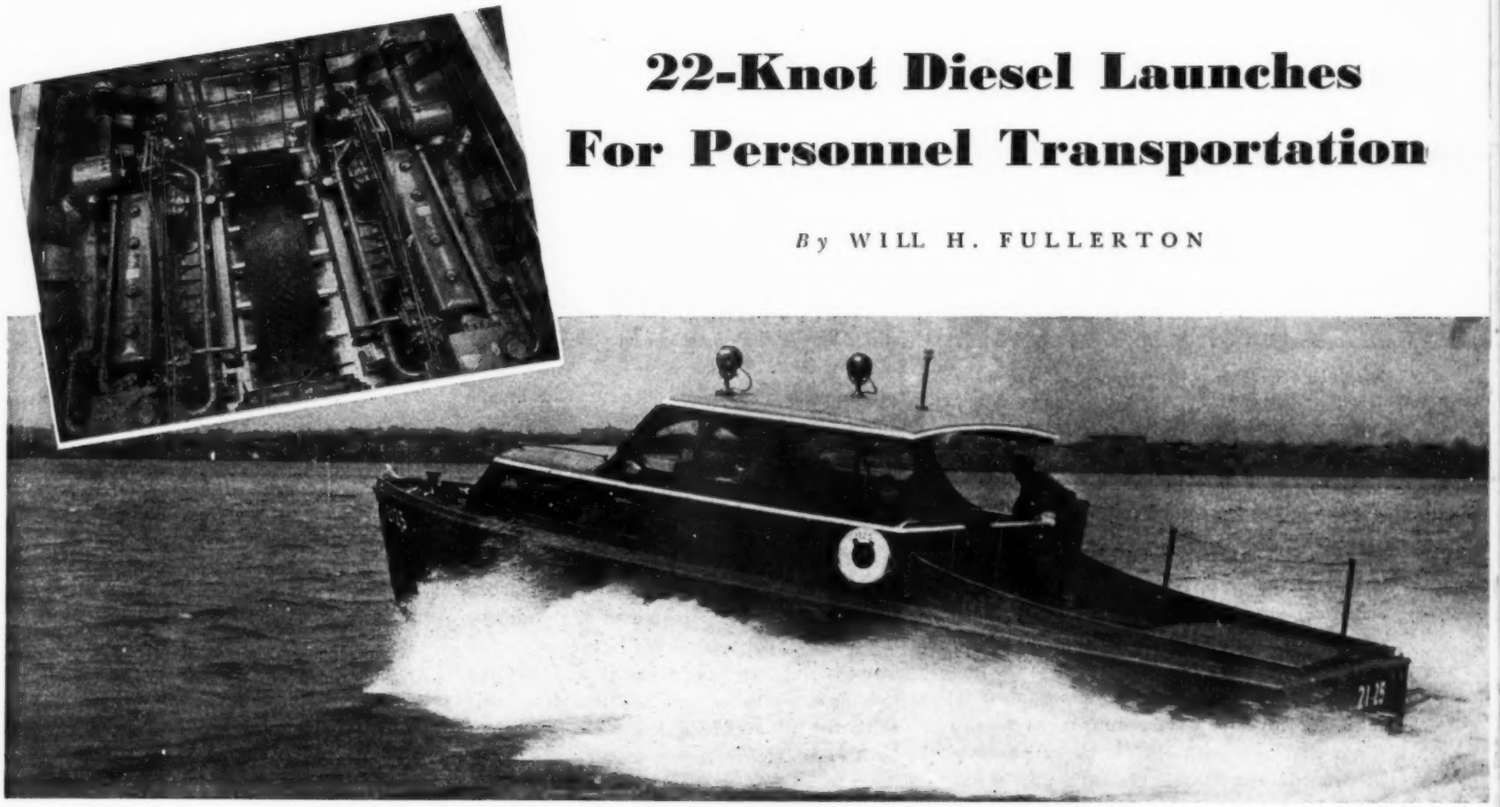
Peterson Brothers, another ranch with a big turkey flock being fed for Thanksgiving market, was caught in the blizzard but saved its year's crop by the use of its Crawler Diesel tractor with LaPlant Choate bulldozer that cleared feed yard and hauled feed to the hungry turkeys. The D4 first cut a road to the turkeys and then cleared a feed yard to get them off the cold snow and ice and down to grass. The Diesel was burning 8-cent-per-gallon Standard fuel and using RPM lube oil. There was one herder with the turkeys when the storm struck the day before the turkeys were to be sold. Said Mr. Peterson, "In a single stretch of 25 hours work our Diesel tractor paid for itself. We hauled feed and water 2 miles over an unbroken trail in snow 2 to 4 feet deep and took in extra men who saved the flock. We would have gladly bought this Diesel tractor just for this job if we hadn't owned one."

The U. S. Soil Conservation Service was sufficiently impressed by this early 1946 Colorado blizzard for its monthly magazine to carry an illustrated article to focus attention on its place in conservation. Waste from this weather hazard was dramatized for a nation at a time when the world needed every ounce of food. These showed Allis-Chalmers, International, Cletrac and Caterpillar Diesel tractors with bulldozers clearing the snowbound roads to ranches and live stock. The use of the Army "weasels" was also pictured delivering food to snowbound ranch homes.

As the writer covers all this mountain, intermountain and plains territory west of the Missouri River and has watched it develop over the past quarter century, he has had a good roving viewpoint to note its growing importance in the national scheme. It has always been a range country and with Diesels, always will be.

22-Knot Diesel Launches For Personnel Transportation

By WILL H. FULLERTON



Twin-screw 40-footer underway at 22 knots. Insert shows twin GM 6-71's installed.

TIME seems to be marching on so swiftly nowadays, carrying progress along with it, that we almost lose perspective, taking so much for granted and little realizing how far mechanical science has advanced in so short a time.

Take Diesels in boats, for instance. Just a couple of decades ago a Diesel in a boat meant a slow boat. It had to be slow; the weight of the machinery demanded a hull form that could carry a load and consequently could not be driven at anything like real speed.

However, a lot of dreams have been coming true in the power plant business and the development of the light weight high speed Diesel is one of them. So now we see fast small boats driven by less volatile, safer fuels burned in Diesels with a high ratio of power to engine weight. And such engines are especially welcome to the firms having to transport personnel over considerable distances with the minimum of risk.

The oil industry particularly has this transportation problem. Oil is just as apt to be located under the sea as anywhere else, apparently, and drilling for it is simply a matter of the right floating equipment to hold the drilling rigs and to bring the engineers and workers to the job. High wages are common in the drilling business, however, and it is usual for the hourly rate to commence when the transportation boat leaves.

This obviously demands a boat able to handle itself in open water and to make good time with a full load of workers. One petroleum company, Creole Petroleum, of Venezuela, a subsidiary of the Standard Oil Company of New Jersey, meets the situations by using all-steel cruiser-type launches, powered with twin Diesels.

These boats were designed by Philip Rhodes, a New York naval architect, and are built for strength as well as speed. Their length is 40 ft. 5 in., with a beam of 12 ft. 8 in. and a draft of only 2 ft. 8 in. These are flat, shallow draft hulls, but their design for some reason includes non-pounding performance in smooth or rough water and an amazing ability to negotiate sharp turns at full speed under full load without heeling either to port or starboard.

Avondale Marine Ways, Inc., New Orleans, was a successful bidder for construction of numerous of these boats. Twenty of these already have been built by this firm with fifteen more on order. Standard Vacuum Oil Co. and Humble Oil also have placed orders, and Alcoa Steamship has ordered a number built to slightly different specifications, using the same hull but with a launch-type body and single screw instead of twin.

The engines chosen to power these fast personnel boats are the General Motors Diesel, Model 6-71, 170 hp. each, with 2.05:1 reduction gear, the new General Motors built-in hydraulically operated gear. These are stock engines in every respect, with the General Motors fuel injection systm, A-C fuel and lube filters, electric starting, built-in heat exchangers and equipped for pilot-house control. And although these 40 ft. all-steel boats are heavy, the cruiser type twin-screw makes 22 mph.

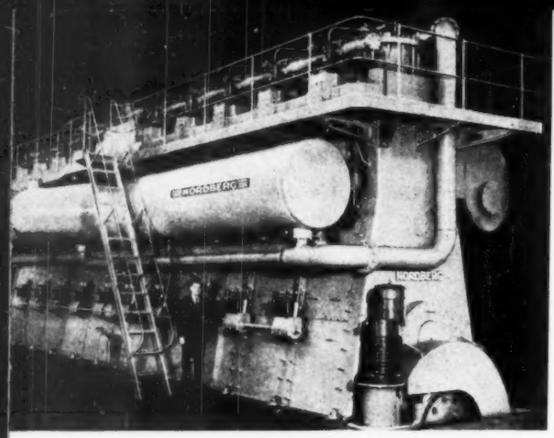
The launch-type, with a single General Motors 6-71, makes a little better than fourteen miles per hour, and this in rough water.

One peculiar characteristic of this hull is to absorb power efficiently. One very well known shallow draft design gets up to fourteen or fifteen miles with economical power, around 100 hp., but to get another couple of miles requires almost double that power. This Rhodes hull, however, in actual trials in rough water with a full load aboard shows an increase in speed of over fifty per cent with the power doubled.

Simplicity and ease of repair is another feature of these hulls. Though they are built of ten-gauge steel, such a skin can be punctured and plates might have to be renewed. In this design, the sections are all straight. There are no reverse plates; new steel plates can be put in without heating or shaping or rolling; the hull can be repaired on a beach or any other place where there is a mechanic with a cutting torch and a welding machine.

As to service, the Creole company's boats run from shore bases to wells being drilled more than thirty miles offshore in Lake Maracaibo, carrying thirty passengers at a time. These boats have no sleeping accommodations. In the Humble boats, also of the cruiser type, there are two berths in the cabin forward.

30,000 KW Diesel-Electric Plant for Mexico City



10-cylinder Nordberg Diesel typical of 12-cylinder Diesels to be installed in Mexico City.

ONE of the largest Diesel electric plants in the world is being constructed to furnish power to Mexico City. Housed in a single building will be six of the most powerful single acting, two cycle Diesel engines ever built in the United States, capable of generating 30,000 kw. at Mexico City's 7,400 ft. elevation. The Nordberg Manufacturing Company will supply all the mechanical equipment which will make this power plant located at Tacubaya, on the outskirts of Mexico City,o ne of the most efficient power plants in Mexico. General Electric Company will furnish the generators and switchgear equipment.

Power requirements of Mexico City have been reasonably met by a number of hydro-electric plants, but the lack of rainfall is causing a serious impending power shortage for the Mexican capital and surrounding area. Steam power plants to augment the hydro power are now being built, and to further assure an adequate and instantaneous supply of dependable power to meet

Mexico City's requirements, Comision Federal de Electricidad of the Mexican Government bought the Diesel electric plant. Alejandro Paez Uriquidi, Executive Director of Comision Federal de Electricidad, an outstanding power plant engineer, was one of the original advocates of this unique Diesel electric power plant and he worked in close harmony with Nordberg engineers and executives to bring to reality the plans for this modern power plant that will assure sufficient power at all times for Mexico City.

Each of the six Nordberg engines for this power plant will develop 8650 bhp. at sea level corresponding to 6000 kw. They are built with 12 cylinder of 29 inch bore, 40 inch stroke and will operate at 167 rpm. for direct connection to General Electric Company 3 phase, 6600 volt, 50 cycle generators. The engines will deliver 7325 hp. at 7400 ft., the elevation of Mexico City, corresponding to a net capacity of 5000 kw. for each generator installed.

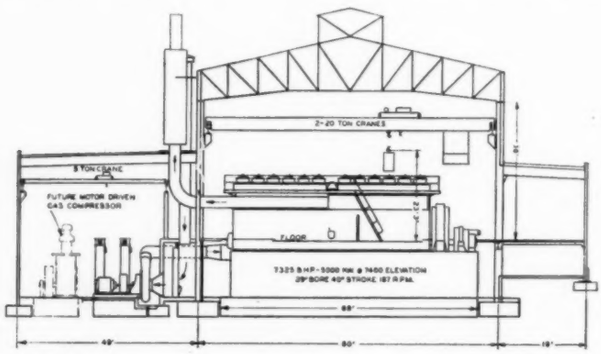
The Nordberg engines are of the two-cycle type with port scavenging and port exhausts. Motor-driven scavenging blowers provide the scavenging air. Each blower motor is connected directly to the generator leads of the engine it serves in such fashion that the blower motor resolves as soon as the main engine generator unit is started. The engines will operate on a fuel oil of approximately the following specifications::

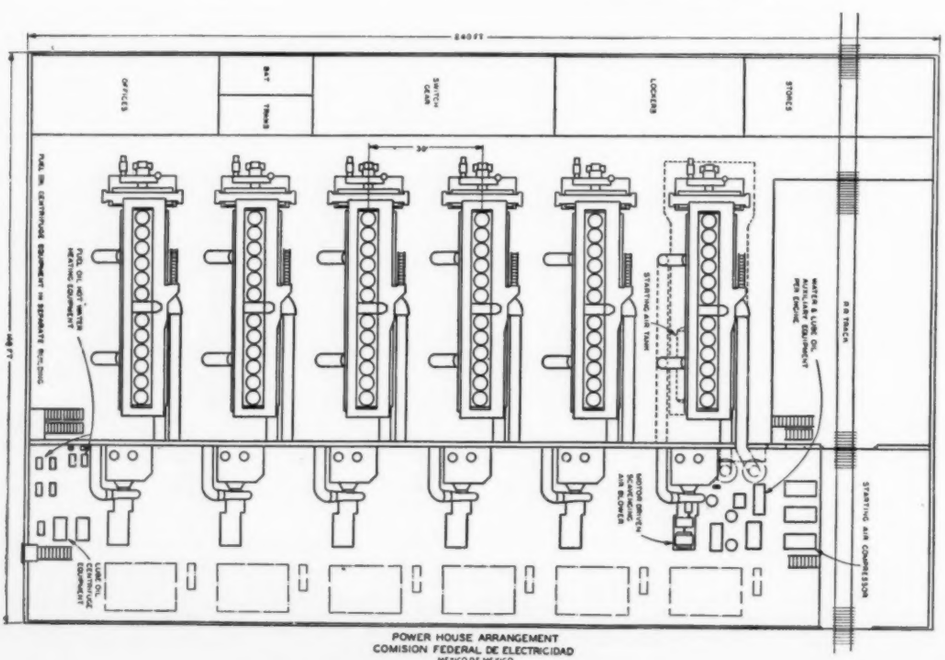
B.T.U. as received	18,560
Specific gravity at 20°C	.946
Moisture, %	0.20
Sediment, %	0.067
Carbon residue, %	9.68
Ash, %	0.043
Sulphur, %	2.61
Flash, °F	245
Viscosity (Saybolt Furol at 122°F	75

All engines will operate in parallel with each other and also in parallel with the hydro electric plants and existing steam plants. The engines are of crosshead construction and have oil-cooled power pistons. Each cylinder is fitted with a separate removable cylinder liner. The engine bedplate, "A" frame columns, and cylinder block are rigidly tied together by means of large tie-rods extending from the bedplate through each leg of the frame columns ot a height above the cylinder block. These tie-rods take all the tensional stresses which occur in the engine structure as a result of the working pressures in the power cylinders. Flywheel type generators eliminate the need of flywheels on the engines.

The Mexican Light and Power Company will operate this plant at Tacubaya. Two Mexican Light and Power Company engineers, Franklin Branin, Civil and Construction Engineer, and J. K. Jennings, Manager of Operations, conferred with Nordberg engineers on the entire arrangement of engines, foundations and auxiliaries so the Mexican Light and Power Company can proceed with the construction of buildings and foundations with their own forces.

It is expected that the first engine will be ready for delivery to Mexico City about May 1, 1948 and one engine will be shipped each month thereafter, until the six units have been completed.





POWER HOUSE ARRANGEMENT
COMISION FEDERAL DE ELECTRICIDAD
MEXICO DF MEXICO

European Motorship Development

. . . . . *Continued from page 53* . . . . .

two-stroke engines as manufactured in Europe are given in Table XIII, and the powers given may be taken as those for maximum continuous rating as stated above. The B. & W. double-acting two-stroke engine with its exhaust sleeve valve and, therefore, a through scavenge, has a substantially higher mean effective pressure than other classes of double-acting machinery.

In single-acting engines the through scavenge system is available in all except the Sulzer design, in the Doxford engine as an opposed-piston type, in the B. & W. engine with poppet or exhaust valves, and in the Gotaverken with poppet valves.

Future Possibilities. While shipowners are watching with close interest the undoubtedly rapid technical progress which is being made in the development of the gas turbine, it is felt that this type of prime mover will have little effect upon marine propulsion for the next five years, by which time, incidentally, the number of orders for new ships may have so diminished that this will have an influence on further advance.

In any event, to be commercially applicable to ship's propulsion, the gas turbine must operate successfully on boiler oil, and so far there is insufficient concrete evidence to demonstrate that this can be carried out. The question will also be complicated if the use of boiler fuels in Diesel engines becomes common practice in the future, and this is a possibility that cannot be ruled out.

Moreover, there is every prospect that the main, if not the exclusive, employment of marine gas turbines, will come with units not below 5,000 to 6,000 bhp. and that, therefore, the new development would not greatly influence the general application of oil engines to ships in powers below this figure. Around 6,000 to 7,000 bhp. direct competition would remain between the Diesel engine and the gas turbine, and it is surprising what a large proportion of the units now needed for marine propulsion are sets of approximately this power.

The present position, as is generally known, is that the first trials of a ship propelled by a gas turbine have just been carried out by the British Admiralty in a motor gunboat 118 ft. in length, of standard design, of which one of the three petrol engines has been replaced by a gas turbine unit. The efficiency is low (a consumption of gas oil of 1.06 lb. per shp. hr.) and the installation is wholly experimental, and has little bearing on the application of the gas turbine for ocean-going ships.

TABLE XIII

Details of Standard European Engines, Double-Acting Engines

Type	B.H.P. Total	B.H.P. Per Cyl.	No. of Cyls.	Cyl. Diam. mm.	Piston Stroke mm.	R.P.M.
B. & W	6,800	850	8	550	1,200	122
do	5,500	1,100	5	620	1,400	107
Stork	6,600	1,100	6	720	1,200	121
M.A.N. Kockum	5,500	685	8	600	1,100	110
do	6,000	1,000	6	720	1,200	110
Fiat	8,000	1,000	8	680	1,200	125
Single-Acting Two-Stroke Engines						
Doxford	6,500	1,080	6	670	2,320	115
do	6,625	1,350	5	725	2,250	120
Sulzer	4,200	700	6	720	1,250	125
B. & W.	3,000	500	6	620	1,150	123
do	7,000	1,180	6	750	2,000	110
Gotaverken	7,250	900	8	760	1,300	130
do	7,000	780	9	680	1,500	112

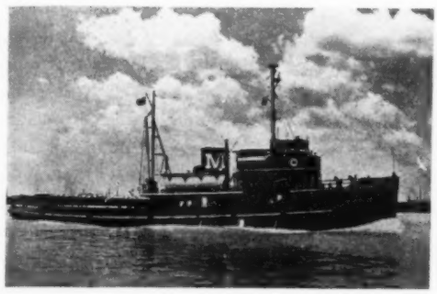
A 2,500 bhp. unit is being built in England for installation in a Diesel-electric tanker now under construction, to replace one of the Diesel generating sets, when the turbine is completed. It is improbable that this will be carried out for another year. Brown, Boveri open-cycle gas turbines are being built in substantial numbers up to 25,000 bhp. but none for marine work, and an order placed at the present time would probably not be fulfilled for some years.

A 7,000 bhp. Sulzer mixed cycle gas turbine designed for marine work will be completed in the near future, and tests commenced, after which will follow a considerable period of experiment, and an experimental Escher Wyss closed cycle turbine has been on tests for several years. The license for the manufacture of this unit has been acquired by John Brown & Co., and other builders are experimenting individually, while the Parons and Marine Engineering Turbine Research & Development Association, with which the leading British steam turbine manufacturers are associated, is devoting most of its energy to

the development of a marine gas turbine. In Denmark, with Burmeister & Wain, Diesel engine manufacturers are also engaged on the same problem and in Sweden some activity is being shown.

Unquestionably, the outcome of all this concentrated work will be the development of satisfactory marine gas turbines, but there is evidently a long period ahead before much commercial progress is likely to be made, and some of the hopes expressed have, perhaps, been slightly exaggerated. The general conclusion may, therefore, be reached that, for many years to come, the Diesel engine will remain the most commonly used propulsive unit for European ocean-going ships.

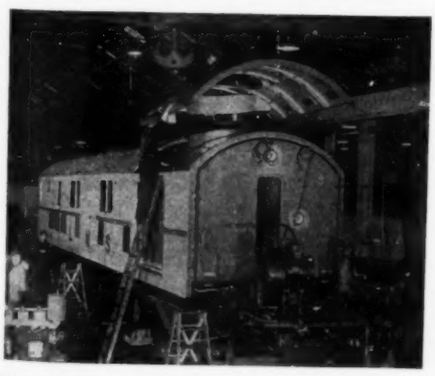
Deep-Sea Tugs For Moran



"Eugene F. Moran" 143-ft. Sea-going Diesel tug recently acquired by Moran Towing.

THE Moran Towing & Transportation Co. has recently announced the purchase of seven seagoing tugs from the U. S. Maritime Commission. These seven tugs are sister ships and saw service with the U. S. Navy during the war. They are 143 feet long, 33 ft. 1 in. in the beam and 14 ft. 6 in. in depth. Each is powered by two General Motors, Diesel engines developing 1900 bhp.

British Diesel-Electric Locomotive



100 mph. Diesel-electric locomotive under construction.

BRITAIN'S London, Midland and Scottish Railroad Company is to introduce Diesel-electric locomotives on its main service lines. These 3200 hp., 100mph. locomotives will be able to haul the heaviest trains on the line. An experimental locomotive is being built at the railroad's Derby plant. British railroads, more and more, are following the American move towards Diesels.

CREATED from the designs of Edwin Monk, naval architect, and launched in 1945 at the shipyards of Grandy Boat Company of Seattle, the 55 foot purse seiner *New Sunrise* has since been almost steadily engaged in salmon fishing off the Alaskan coast. During this period she has been bringing in more than her share of pay loads to the Western Fisheries Cannery at Cordova, Alaska, and Parks Cannery Company of Oyak, Alaska. Only once were her frequent trips to the North Pacific fishing grounds interrupted. In January of this year Gordon Nelson, owner of the craft, brought her into Seattle to have the original 140 hp. gasoline engine replaced with a 165 hp. General Motors 6 cylinder Diesel engine. The new General Motors Diesel equipped with a 3 to 1 reduction gear turns a 36 in. x 28 in. propeller and operates at 1,700 rpm. during normal cruising.

Since rejoining the Alaskan fishing fleet with her new power, the boat has consistently logged a snappy 9.5 knot cruising speed which is one and a half knots faster than she was able to clock with her original engine. According to Mr. Nelson this extra edge in speed and power is of real value and many times he has had occasion to appreciate its availability. The vessel is of wood construction having a 16 ft. beam and normal draft aft of 6 ft. A generous cargo hold gives her a storage capacity of approximately 26,000 humpback salmon.

NEWS OF THE INDUSTRY

ELECTRIC AUTOLITE Company has announced that the company's bid for the former Wright Aeronautical plant at Lockland, Ohio, has been accepted. The plant will alleviate congested conditions at the lamp division plant in Cincinnati. The purchase price was $8,400,000.

BROWN INSTRUMENT Company has established sales and service offices at 400 Broadway, Denver, Colorado and 36½ West Second South, Salt Lake City, Utah. Donald Larcen will handle the Denver office and George Winslow will be in charge at Salt Lake.

GENERAL ELECTRIC Company has agreed to supply Argentina with 95 Diesel-electric locomotives during the next three eyars. The contract will approximate $18,000,000 and deliveries will start early in 1949.

SIR FREDERICK CARSON, Executive Vice-President of the Montreal Locomotive Works recently announced its entry into the Diesel-electric locomotive field. An affiliate of the American Locomotive Company, the concern will begin construction of switcher and road switcher types.

NATIONAL SUPPLY Company recently completed a rush shipment of two 1440 hp. Diesels to Caracas, Venezuela, to alleviate an expected power shortage in that city. Upon three days of the receipt of the order the Diesels were on board a ship bound to South America.

ALUMINUM COMPANY of America in a year end report announced that the production of primary aluminum in 1947 would be approximately 1,140,000,000 lbs. by the whole industry. Despite the upsurge of prices for most other materials, the basic price of aluminum has decreased a full 30% since 1939. This factor has been important in the changeover to aluminum from other more expensive metals by many manufacturers including Diesel industry.

WOODWARD GOVERNOR Company has received a second Accident Prevention award from the Liberty Mutual Insurance Company in recognition of the governor concern's continued outstanding industrial safety record.

KOPPERS COMPANY, Inc., in its annual report stated that the Piston Ring Division has developed a new high test iron ring, cast centrifugally, to supplement its present line. Koppers Porous Chrome piston rings are now being used as standard equipment by four truck manufacturers.

POWDER METALLURGY has developed a porous metal filtering media which can be formed in a variety of shapes. Porosity of the material can be controlled and can be furnished in a variety of metals to meet non-corrosive requirements. The Diesel application of this material lies in its use as a filtering media in Diesel fuel lines. For further information write Henry L. Crowley & Co., Inc., West Orange, New Jersey.

LE ROI COMPANY recently announced the resignation of C. W. Pendock as president of the company. Mr. E. A. Longenecker, formerly president of the Lauson Division has been elected as the new president. Mr. Pendock following his resignation was elected chairman of the board.

STEWART AND STEVENSON SERVICES in a new bulletin describe their "remanufacturing" of General Motors Diesel engines. Bulletin cites time saved by this method of "Overhaul" which consists in the shipment of the old engine to Houston and the shipment from Houston of a guaranteed rebuilt Diesel to the owner.

BALDWIN LOCOMOTIVE COMPANY recently delivered first of ten 1500 hp. Diesel-electric locomotives to the Norfolk and Southern Railway Company. The new locomotives have an 8 cylinder 1500 hp. Diesel propulsion engine.

WOODWARD GOVERNOR'S Service Department, active for over a year now has proved to be eminently successful. The size of the department has doubled while the volume of field work has decreased. This is the result of the company's policy of exchanging long service governors for factory rebuilt governors which results in less outside repair work and the fact that governor owners are better acquainted with their equipment. In cases of emergency the department has at its disposal two planes which can deliver governor experts to the scene within a matter of hours.

YOUNG RADIATOR COMPANY has developed a new type radiator known as the "Mono-Weld," which is suitable for use with heavy-duty engine applications. The utilization of electric welding techniques has resulted in a fabricated consrtuction for headers and structural parts. Radiator tubes are brazed to header plates. The new radiators are equipped with a variable pitched fan for accurate temperature control.

BLACKMER PUMP COMPANY recently announced the appointment of George A. Baldwin as manager of the Los Angeles Sales Office. Mr. Baldwin was formerly associated with the Garrison Advertising Agency of Grand Rapids.

Additional warehouse space has been purchased by Blackmer's Ohio sales representatives, William Berrington & Son, Inc. The Berrington firm has been associated with Blackmer since 1915.

PERFECT CIRCLE Sales Manager J. C. Hamilton announced recently that Arthur Hopkins has been appointed as an Assistant Sales Manager of the Corporation's sales staff. Kenneth Sloane, formerly District Manager in New York City will replace Hopkins as Regional Manager.

SKF INDUSTRIES, INC., looks forward to 1948 as a year in which production will stay at record heights. The company, which acquired two additional plants during 1947, is now prepared to produce a wide variety of anti-friction bearings in production quantities.

OIL FIELD ENGINES are the subject of an attractive bulletin recently issued by the Detroit Diesel Engine Division of General Motors which describes the 4-engined quad, the 2-engined twin and the single unit Diesel together with performance curves and other pertinent information. Copies of the bulletin may be had by writing General Motors Corporation, Philtower Building, Tulsa, Oklahoma.

A NEW LINE of heavy-duty Diesel engines is announced in a new bulletin No. 764-2 issued by the Chicago Pneumatic Tool Company. Features and specifications of both naturally aspirated and turbo-charged Diesels are described. Write for bulletin, 6 East 44th St., New York 17, N. Y.

THE HILLIARD CORPORATION recently announced the appointment of new representatives to handle the line of Hilco oil purifying equipment. They include: Hucker Sales Company of Philadelphia, Pa., R. T. Whitson & Son of Cincinnati, L. M. Sands & Company, San Francisco ington.

THE FARR COMPANY of Los Angeles, California, has recently added district warehouses in New York and Chicago to permit faster distribution of the company's Far-Air Filters.

DETROIT DIESEL Engine Division announces that the Colorado Builders Supply Company has been named industrial distributors for General Motors Series 71 Diesel engines. The company has offices in Denver, Colorado, and Scottsbluff, Nebraska.

OF INTEREST to the Diesel engine industry is a new directory of Commercial and College laboratories compiled and published by the National Bureau of Standards, Washington, D. C.

A NEW *Tube Fitter's Manual* has been recently published by the Parker Appliance Company. The Manual, for the first time covers the whole field of metal tubing installation. It includes detailed information on Diesel engine tubing problems.

REPS TOOL COMPANY, Inc., formerly of New York City, announce that the company has moved to Hartford, Conn. The company manufactures a line of pipe and stud extractors.

THE AIRCRAFT SCREW PRODUCTS Company, Inc., of Long Island City, New York, has changed its name to the Helicoil Corporation. The name is taken from the name of the company's principal product, Heli-Coil Screw Thread Inserts.

WESTON ELECTRICAL Instrument Corporation now occupies its new building at Newark, N. J. Following an Open House celebration last fall the new building now houses the engineering and administration divisions of the corporation. The plant now covers 20 acres and has 380,000 sq. ft. of floor area in 19 buildings. The new building, 78,000 sq. ft., has extensive facilities.

LATEST ASME RELEASE describes new silicone rubber derivative as suitable gasket material for air connections. Cites use on Diesel engine under 300° F. 15 psi. conditions. Paper submitted by G. E. researchers.

ACCORDING TO EXPERTS the United States should establish a synthetic liquid fuels industry to augment present petroleum resources. Best synthetic Diesel fuel available from oil shale found in Western states.—ASME release.

ON recently an
representative
purifying equip
es Company o
& Son of Cin
San Francisco

Angeles, Cali
warehouses in
faster distribu
rs.

ion announces
Company has
s for General
The company
nd Scottsbluff,

e industry is a
College labora
the National
D. C.

been recently
Company. The
he whole field
ludes detailed
g problems.

merly of New
ny has moved
manufactures

DUCTS Com
ew York, has
Corporation.
of the com
Screw Thread

ent Corpora
at Newark,
lebration last
engineering
corporation.
has 380,000
s. The new
facilities.

new silicone
material for
ngine under
ubmitted by

nited States
els industry
es. Best syn
ale found in

She has to take chances ... YOU CAN PLAY SAFE!

Wherever high speed Diesels are used, don't risk needless downtime, disrupted schedules and the heavy expense of frequent piston ring replacements.... Play safe!... Install Koppers American Hammered Porous Chrome* Piston Rings. Made of F-88 metal, a centrifugally cast iron with 2½ times greater tensile strength and 50% higher modulus of elasticity, Porous Chrome rings are unbreakable in service! And they seat immediately, eliminating the damaging wear of the break-in period. Substantially longer ring life is assured, with cylinder wear reduced as much as one-half. Need of chrome plating the cylinder liners is eliminated.

Play safe, then, on your next job. There is a Koppers piston ring combination, including the spectacular Porous Chrome compression ring, for original equipment or replacement service in any high speed engine. Koppers Company, Inc., Piston Ring Division, Box 626, Baltimore 3, Maryland.

*VAN DER HORST PROCESS

K KOPPERS

IN EVERY SIZE • OF EVERY TYPE • FOR EVERY PURPOSE

American Hammered Piston Rings

Making piston rings is just one way in which Koppers serves industry. Koppers also produces chemicals from coal. It manufactures flexible couplings, roofing, paving materials, airplane propellers. It is a leader in the wood preserving industry. It designs and builds most of America's coke ovens. There are many Koppers products or services that can help your business. Koppers Company, Inc., General Offices, Pittsburgh 19, Pa.

Hechler Celebrates 25-Year Service at Penn State

F. G. HECHLER, director of the Engineering Experiment Station at the Pennsylvania State College recently celebrated his first quarter-century anniversary at a testimonial dinner attended by his friends and associates. He was presented with a congratulatory scroll in recognition of his 25-year service.

Hechler received his B.S. and M.E. degrees at the University of Missouri in 1908 and 1910 and then taught at Rensselaer Polytechnic Institute until 1916. From 1916 to 1919 he held the position of Mechanical Engineer at the U. S. Naval Engineering Experiment Station at Annapolis, Md. From 1919 until 1922 he was associated with the Vibration Specialty Company of Philadelphia, Pa. In 1922 he was appointed Professor of Engineering Research at Pennsylvania State College, a position which he still holds. He assumed additional duties in 1936 when he was named Director of the Engineering Experiment Station.

Professor Hechler has been active in the engineering societies since he joined the A.S.M.E. in 1915 and has served on many special committees, both national and state. In 1936 he was elected member of the Executive Committee Oil & Gas Power Division of A.S.M.E. and in 1939-40 was chairman of the Division. Although nationally known for his work in heating and air conditioning, his contributions to the growth of the Diesel industry are many and through his position of Engineering Research at Penn State many valuable studies in Diesel engineering have been made.

Mining With Diesel Tractor

G-M Diesel in Allis Chalmers Tractor equipped with exhaust conditioner.

OXYGEN is injected into the engine exhaust manifold of this Diesel tractor at the Eagle Picher Mining Co., at Cardin, Oklahoma, thus supporting combustion of harmful carbon monoxide and converting it to carbon dioxide in quantities that are harmless to men. Although mining laws and regulations of several states have prohibited the use of internal combustion engines in underground operations, development of detoxification equipment has induced many legislatures to revise their laws.

NAMES IN THE NEWS

CATERPILLAR TRACTOR Company has recently named Kenneth F. Ames, Russell S. Cornell and Truman E. Sage as assistant sales managers of the Central, Eastern and Western Sales Divisions respectively. H. J. Hunkele, Jr., has been appointed district representative for the Eastern Sales Division.

CONCURRENT with the transfer of certain operations into the new Diesel Engine factory, Caterpillar has named Lloyd J. Ely as factory manager. Cary Ice will serve as assistant factory manager.

JOHN S. BARNES Corporation recently announced the appointment of the B. W. Rogers Company of Akron as its sales representative in northern Ohio.

SOCONY-VACUUM Oil Company recently announced the transfer of Earl Whatley from the Lubrite Division to the position of manager of the Product Purchase Division of the Gasoline and Fuel Oil Department. Also W. R. Johnston, manager of the Springfield, Mass., marketing district has been named manager of the company's Albany division.

NORDBERG COMPANY has named Howard L. Phillips as assistant export manager. This marks another step in Nordberg's increasing activities in the export field.

A. G. SCHOONMAKER Company, Inc., has named Arthur F. Hoffman as Comptroller of the company.

CHAIN BELT Company announced recently the election of three vice presidents. L. B. McKnight was named executive vice president in charge of Conveyor and Process Equipment and Construction Machinery. O. W. Carpenter was named vice president in charge of finance and B. F. Devine who will manage the Construction Machinery Division.

L. C. SORENSON, President of Kelite Prdoucts, Inc., announces the completion of new plant. Kelite manufactures engine cleaning compounds.

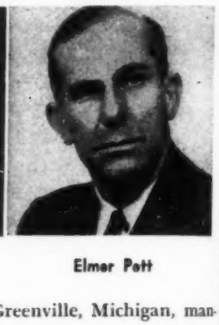
FALK CORPORATION recently announced the promotions of Harry Green and Carl Senn to consulting positions on the company staff. B. C. Bugbee, has been appointed Machine Shop Superintendent.

GENERAL CONTROLS Co. has named Don S. Bentley as factory branch manager of the company's Los Angeles Branch and F. E. Weldon as factory branch manager of their New York office. C. G. McCarthy has been named Detroit factory branch manager.

AEROQUIP CORPORATION recently announced the election of Peter F. Hurst as President of the corporation. Aeroquip manufactures flexible hose, fittings, and hydraulic accessories.

VAPOR HEATING CORPORATION is the new name of the Vapor Car Heating Company, Inc., according to a recent announcement by A. D. Bruce, president of the corporation. The Vapor-Clarkson steam generator, widely used to supply heat for Diesel passenger trains, is a product of the newly renamed corporation.

Robert Klare



Elmer Pett

FEDERAL-MOGUL'S Greenville, Michigan, manufacturing plant is now managed by Robert Klare, according to a recent announcement by Guy S. Peppiatt, Executive Vice President of the company. Klare replaces M. A. Hunter, who assumed the newly created post of General Manufacturing Manager on December 1. Elmer Pett will manager the St. Louis plant.

DIESEL ENGINEERING and Manufacturing Corporation has announced recently the appointment of Harry O. Hill as Manager of Sales and Field Engineering. The corporation also announced an expansion of their facilities for manufacturing fuel injection equipment.

ARTHUR DUVIC'S SONS Atlas distributors in New Orleans announced the entrance into the partnership of Philip E. Duvic, eldest son of Manuel Duvic, the firm's general manager.

NORDBERG MANUFACTURING Company recently announced the appointment of T. C. Wiedenhoefer as Sales Manager, Mine Hoist and Special Machinery Department of the Heavy Machinery Division.

PENN ELECTRIC Switch Company recently named E. M. Smith as manager of the Chicago Branch Office. Previously, Smith was manager of the Detroit office.

VICE PRESIDENT William L. Lentz of the American Locomotive company has taken over the duties of J. B. Ennis, senior vice president, who recently resigned, according to an announcement by Robert B. McColl, president. His new duties will include general railroad engineering contracts, studying and promoting progress and improvements in motive power designs for domestic and foreign railroads, research and assistance to all divisions in their engineering and manufacturing activities.

W. A. REYNOLDS, manager of the IMO rotary rotary pump division of the De Laval Steam Turbine Company has been apopinted manager of the company's newly combined IMO pump and worm gear divisons.

W. A. Reynolds

Reynolds became associated with De Laval in 1932 when he was made manager of the IMO pump division, a position which he still retains as part of his new position. Previously he was connected with the Hendry Machine Company and the Dravo Corporation of Cleveland.

SKF INDUSTRIES, Inc., recently announced the appointment of the following men: John H. Tipton as assistant district manager of the Cincinnati office; M. H. Courtenay as assistant district manager of the Atlanta office; and E. A. Hutson as field engineer in the Railway Sales Department of the Chicago office.

COOPER-BESSEMER Corporation has announced recently the elevation of three of its sales executives to positions of Vice President. Those so honored include J. W. Reed, the company's Atlantic Coast Manager of Gas Engine and Compressor Division: A. A. Burrell, Southwestern District Manager: and B. L. Potter, Midcontinent Manager.

J. W. Reed

A. A. Burrell

Reed served the company as Pacific Coast Manager from 1925 to 1940 when he assumed his present position in New York. He is a graduate of Ohio State University. Burrell joined Cooper-Bessemer in 1925 and has been Southwestern District Manager since that time. He has had widespread experience in the oil fields and hold membership in the American Institute of Mining and Metallurgical Engineers. Mr. Potter will soon complete his 35th year in the engine building industry. He joined the Bessemer Gas Engine Company in 1913.

B. L. Potter

"ALL INDUSTRY, including the Diesel industry, has a stake in the atom," Dr. Robert M. Hutchins declared recently in an address before the National Association of Manufacturers.

Dr. Hutchins gave three reasons for this lack of interest: 1. Mistaken belief that atomic energy is government monopoly. 2. Idea that atomic energy development will be postponed indefinitely for reason of technical difficulties. 3. The belief that only a few specialized industries can benefit from atomic energy.

The chief advantage of atomic research at this stage is the use of radio-isotopes to determine how various processes take place. Already more than 1,000 industrial possibilities of radio-isotopes have been cataloged. It is now possible for industry to take part in these developments by joining in the program initiated by leading universities. Memberships to industry participants are available for $50,000 a year at the University of Chicago according to Dr. Hutchins. Already Westinghouse Electric Manufacturing Company and the Aluminum Company of America have joined with the University of Chicago in a combined program of atomic research along with the Standard Oil Company of Indiana, Shell Oil Company, Sun Oil Company and Standard Oil Development Company of New Jersey.

Nordberg Appoints H. M. Cahill

H. M. Cahill

THE appointment of H. M. Cahill as Sales Manager, Small Engine Department, is announced by R. W. Bayerlein, Vice-president of the Heavy Machinery Division, Nordberg Manufacturing Co., Milwaukee 7, Wisconsin.

Mr. Cahill has had extensive sales engineering experience in the smaller four-cycle Diesel engine field. Prior to joining Nordberg he was Assistant to the Sales Manager of National Supply Co., Springfield, Ohio. He has also been associated with the Buda Company, Harvey, Illinois.

Mr. Cahill will have charge of sales of Nordberg four-cycle 4½ in., 9 in., and 13 in. bore Diesel engines. L. L. Peterson, Sales Manager, Large Engine Dept., is responsible for sales of the 16 in. bore size four-cycle engine and the larger Nordberg two-cycle Diesel engines. Foreign sales of all Nordberg products is directed by B. T. Eagerton, Export Sales Manager.

Diesel-engined Sealer On Maiden Voyage

Sealer "Terra Nova" ready for sea.

OFF on her first sealing voyage in the Arctic regions of Labrador is the 140 foot *Terra Nova*, recently designed for Bowring Brothers, Ltd. The vessel is 140 feet overall and has a 28 foot beam and 14 foot moulded depth. Tonnage is 379 gross. Her 6 cylinder reversible Cooper-Bessemer Diesel swings a 72 inch propeller at 325 rpm. for 9 knots.

Two Gulf Oil Vice-Presidents

R. M. Bartlett H. P. Hobart

AT a meeting of the Board of Directors of the Gulf Oil Corporation and the Gulf Refining Company recently, R. M. Bartlett was elected Vice President in Charge of Fuel Oil Sales and H. P. Hobart was elected Vice President in Charge of Lubricating Oil Sales.

Another Enterprise Office In the Midwest

Glenn Harris

THE Diesel Engine Division of Enterprise Engine and Foundry Company has established a branch sales and service office in Omaha, Nebraska. Manager of the new office and sales representative for the area is Glenn Harris, until this appointment attached to the home sales office in San Francisco, California.

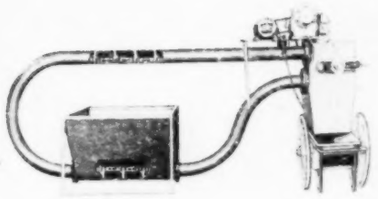
Robert Schoonmaker Dies

ROBERT SCHOONMAKER, founder and President of Diesel Motors Corporation of Port Washington, New York, died at his home on January 6th, 1948, as a result of a cerebral hemorrhage.

Mr. Schoonmaker formerly was associated with his father, A. G. Schoonmaker, in a machinery business in New York City, and for a number of years worked as an engineer in the automotive division of the American Locomotive Company in Providence, R. I.

John V. V. Schoonmaker has been named to succeed his brother as President of the Diesel Motors Corporation.

New Sediment Removal and Transfer Conveyor Cleans Settling Tanks



Houdaille conveyor

FOR completely automatic removal and transfer of sediment from settling tanks without removal of fluid, a new mechanism known as the "Houdaille Conveyor" is being marketed by the Honan-Crane Corporation.

The Houdaille Conveyor is basically an endless link-chain, motor-driven, on which 4 inch neoprene rubber flights are mounted at 6 inch intervals. It operates through the V-bottom of the settling tank, trapping the sediment between the flights and conveying it through a 4 inch pipeline to a collection and disposal point.

For complete information write Honan-Crane Corp., 202 Indianapolis Ave., Lebanon, Indiana.

Industry News

CAUSES OF VALVE FAILURE is the title of an interesting article in the recent issue of the *Eaton Forum*. Vincent Ayres, the author, traces valve failure from the designing board to the engine itself. Write Eaton Manufacturing Company, Cleveland, Ohio, for a copy.

WHITMAN & BARNES has recently published a new catalog, No. 101, listing various types of carbide tipped tools. Catalog available by writing Whitman & Barnes, 2108 W. Fort St., Detroit 16, Michigan.

AMERICAN BOSCH'S latest Directory of Service Stations lists over a thousand stations in the U. S. and Canada where American Bosch equipment may be serviced. Both automotive electrical and Diesel fuel injection stations are included.

A NEW LOCKNUT with a replaceable locking unit is the latest development by Sam Bloomfield of the Swallow Airplane Company of Wichita, Kansas. Full holding strength of the lock nut is restored by replacing only the locking unit retained in the crown of the nut. Because of the replacement feature, the lock nut lends itself to greater use in larger sizes since the cost of the replaceable units is negligible.

OHIO CRANKSHAFT COMPANY recently announced the purchase of the Induction Heating Division of the Budd Company located in Detroit for its Tocco Division.

PERFECT CIRCLE Corporation recently announced the retirement of George Keagy from the position of Hagerstown Plant manager effective January 1, 1948. George Myers has been named to replace him.

LONG ISLAND Railroad has recently ordered an additional 38 Diesel locomotives which will enable the railroad to eliminate all coal burning locomotives in freight and switching service within N.Y.C.

PLOMB TOOL COMPANY is now offering three basic end wrench sets. The sets include open end or box type wrenches or combinations in popular sizes. Write Plomb Tool Company, Los Angeles 54, California, for further information.

AMERICAN DIESELS are preferred by Latin American buyers according to William Brumback, director of foreign marketing for Hallett Manufacturing Company, because of American design and dependability.

INSTRUMENT SOCIETY of America announces its 1948 Meeting will be held in Philadelphia September 13-17, 1948.

INTERNATIONAL HARVESTER Company recently announced the production of a new six-cylinder Diesel capable of developing 191 hp. at 1375 rpm. It has a 5¾ inch bore and a 7 inch stroke and is designed for heavy duty operation in industrial and oil field use. It is the largest engine built by the company. Furnished as a power unit, equipped with radiator, fan, clutch, and power take-off, the engine develops 180 hp. at 1375 rpm. By use of the International Harvester precombustion chamber, it is possible for the engine to efficiently burn low cost fuels such as No. 3 fuel oil. For further information concerning this Diesel write the Industrial Power Division, International Harvester Company, 180 North Michigan Ave., Chicago 1, Illinois.

PISTON RING purchasers will be interested in a new 36-page catalog published by C. Lee Cook Manufacturing Company which fully describes the complete line of Cook Graphitic Iron Piston Rings for industrial size Diesels and Compressors. Catalog gives details on ring design, and construction, ring service and ring specifications. Copies are available to design and operating engineers by writing the General Sales Office, 76 Beaver St., New York 5, N. Y.

INDICATOR KITS for determining the CO_2 content of exhaust gases are described in the recent issue of the *Eberbach Announcer*. This Burrell Indicator is useful in determining the efficiency of engine combustion. Copies of this magazine may be obtained by writing Eberbach and Son Company, Ann Arbor, Michigan.

SHAFTING REPAIRS by the metal spray process are now possible without surface preparation according to a recent announcement by the Metallizing Engineering Co. By using Metco Sprabond, applied by standard metallizing gun, a strong bond is applied to parent metal without surface preparation. However the surface must be clean. For further information on this process write the Metallizing Engineering Co., Inc., 38-14 30th St., Long Island City 1, N. Y.

HALLETT MANUFACTURING Company recently announced a new Diesel-electric set called the Hallett quill-mounted marine Diesel electric generating set. Photograph shows generator shock mounted. It has push button starter.

Hallett Diesel set

These Diesels are now being manufactured in 3 to 7½ kw. sizes in the quill-mounted series. Belt driven models are available in the 2 to 10 kw. sizes.

THOMAS Flexible Coupling Co. has published a new engineering catalog describing its line of flexible couplings. This catalog is available to interested readers by writing to the company at Warren, Pennsylvania.

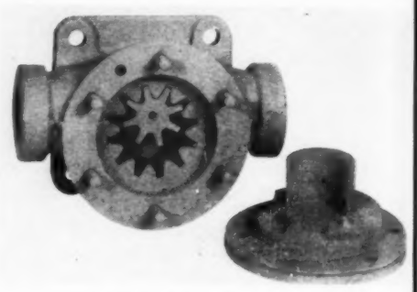
MINES EQUIPMENT Company has recently published two new bulletins describing the company's new cable vulcanizer and molded rubber electric cable connectors. Stressing the salvageability of damaged cable, and resultant savings encountered through use of cable vulcanizers, bulletin describes both steam and direct heat models.

A comprehensive bulletin listing with prices the Mines Equipment Co. molded rubber connectors and receptacles, is also offered. The use of these connectors is recomemnded by the company for outside power installations subject to adverse weather conditions. Both these bulletins are available by writing Dept. 10, Mines Equipment Company, 4215 Clayton Avenue, St. Louis 10, Mo.

CIVIL ENGINEER CORPS Bulletin for December describes the building of the Guam power system after its destruction during the war. The new power system comprises 5 Diesel electric plants having a total of 24 generator sets coupled by 25 miles of high voltage lines and 80 miles of distribution circuits. Diesels include Worthington and Fairbanks-Morse units.

AMERICAN AIR FILTER CO. has recently published a new bulletin No. 150 describing the Multi-Duty air filter for engine and compressor service. Write American Air Filter Co., 215 Central Ave., Louisville, Kentucky.

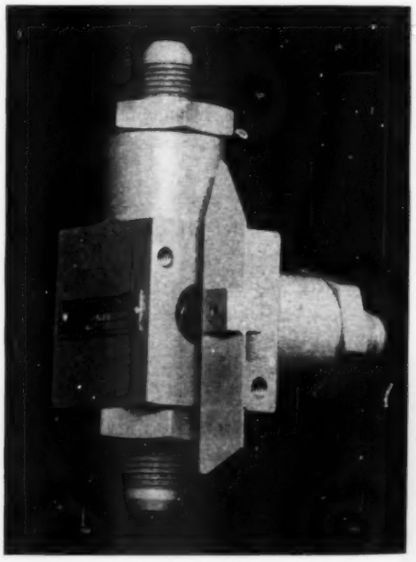
HAIGHT PUMP Company bulletin recently received describes a line of internal gear rotary pumps. Useful for fuel, lube, and water pumping, Haight pumps are available in 3 series of sizes



Haight Rotary Gear Pump

ranging from 3 gpm. to 31 gpm. capacities. Pressures up to 200 psi. are possible. Write Haight Pump Company, 2310 West Vliet Street, Milwaukee 5, Wisconsin, for further information.

A NEW positive-position and positive-sealing fuel tank selector valve was announced recently by Electrol Incorporated.



Electrol fuel selector valve

The Electrol 4-way fuel selector valve, designated as Model 544, assures positive positions of the control handle by means of built-in detents, features a poppet type valve that assures "free" operation and eliminates sticking, even over a long period of time, has low pressure drops and has connecting fittings that are integral with the unit. For further information write Electrol Incorporated, 85 Grand St., Kingston, New York.

A NEW 4-page bulletin in color, illustrating and describing 16 new and improved models of E-C Lightrol engine generator automatic load demand control units, has just come off the press. Featured is the new E-C *Midget* Lightrol which functions on all loads of 25 watts or more and provides fully automatic operation for any A.C. en-

gine generator set equipped with electrical starting system. Address requests for Bulletin 102-L to Engineering Controls, Inc., 2833 East 11th St., Los Angeles 23, California.

FLEXIBLE metallic tubing made from monel metal for use where severe corrosion or high temperatures are encountered, has just been announced by Titeflex, Inc.

New Titeflex tubing

Titeflex monel metal flexible tubing is supplied for four temperature ranges from 358-1790° the temperature range depending upon the melting point of the solder used in the seam of the inner-core. For further information write Titeflex, Inc., 524 Frelinghuysen Avenue, Newark 5, New Jersey.

RECENTLY COMPLETED by the Austin Company, the new Shell laboratory, costing $1,300,-000, is the latest in design and construction. There are more than 44,000 square feet of working area divided into more than 100 rooms. The building

is completely air conditioned and is adequately protected against damage to property or injury to personnel. Shatterproof safety glass has been used throughout all interior partitions and doors, and pushbutton emergency shut-off controls for all building services.

THE ENTIRE DIESEL IND

Whatever you are looking for in Diesel Engines, o cessories, you will find them described and illustr in the 1947 DIESEL ENGINE CATALOG, Volum edited by Rex W. Wadman. What's more, you wil complete specifications on

12th EDITION OF THE

822 DIFFERENT MODELS

The Products of 53 Engine Manufacturers. Each engine description is compl accurate — checked and double-checked by the Manufacturer himself. Illus include full-page engine views, lube and fuel system diagrams, also cooling syst many traced in color.

But that is just the Diesel engine section. The Catalog also includes an ad section carrying valuable information on the various Fuel Injection Systems, Ge Chain Drives, Turbo-chargers, Blowers, Magnetic Couplings, all fully describ profusely illustrated.

DIESEL ENGINE

53 DIESEL ENGINE MANUFACTURERS BUILDING 822 MODELS

$10

American Locomotive Company
Anderson Diesel Engine Company
Atlas Imperial Diesel Engine Company

Baldwin Locomotive Works
Buckeye Machine Company
The Buda Company
Burmeister & Wain

Caterpillar Tractor Company
Chicago Pneumatic Tool Company
Clark Brothers Company
Consolidated Diesel Electric Corporation
Climax Engineering Company
Continental Motors Corporation
Cooper-Bessemer Corporation
Cummins Engine Company

Enterprise Engine & Foundry Company

Fairbanks, Morse & Co.
Fulton Iron Works Company

General Machinery Corp. (Hooven, Owens, Rentschler Division)
General Motors Corporation
Cleveland Diesel Engine Division
Detroit Diesel Engine Division
Electro Motive Division
Gray Marine Motor Company

Hallett Manufacturing Company
Joshua Hendy Iron Works
Hercules Motor Corporation
Hill Diesel Engine Company (Division of Rogers Diesel & Aircraft Corp.)

Ingersoll Rand Company
International Harvester Company

Kahlenberg Brothers Company
Kermath Manufacturing Company

Lathrop Engine Company
Lincoln Diesels (Bolinders Company)
Lister-Blackstone Inc.
Lorimer Diesel Engine Company

Mack Mfg. Corporation
Murphy Diesel Company

National Supply Company (Superior Division)
Nordberg Manufacturing Company

Palmer Bros. Company

Rathbun-Jones Engineering Company

John Reiner Company

R. H. Sheppard Company
Sterling Engine Company
Sun Shipbuilding & Drydock Corp.

Union Diesel Engine Co.
United States Motor Corporation

Vann-Severin Machine Company

Washington Iron Works
Waukesha Motor Company
Witte Engine Works
Wolverine Motor Company
Worthington Pump & Machinery Corporation

ORDER YOUR COP

at your fingertips

$1,000,000.00

in UNUSED

GOVERNMENT SURPLUS

G. M. DIESEL SPARE PARTS

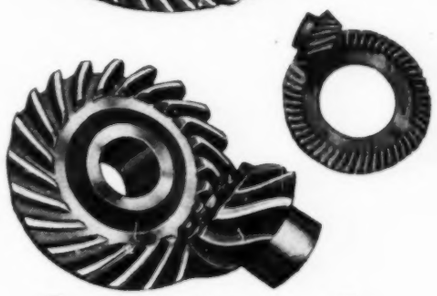
- low prices on individual and lot purchases

WRITE, WIRE, PHONE - YOUR REQUIREMENTS - TODAY!

MILL BASIN SHIP REPAIR CO. inc.
MILL AVENUE & AVENUE U • BROOKLYN, N. Y.
Tel. ESplanade 7-9088

BEVEL GEARS

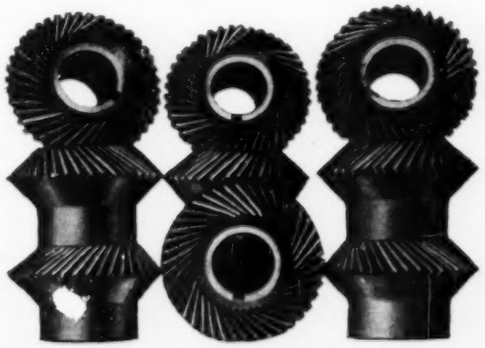
★ STRAIGHT BEVEL
★ SPIRAL BEVEL
★ MITRE SPIRAL BEVEL



Brad Foote Gears

CAPACITY

Brad Foote Precision Cut Gears — every type — spur — helical — herringbone — bevel — non-ferrous — made in quantities of any proportion. Write for details and delivery schedules when in need of quantity deliveries to meet your necessary requirements.



BRAD-FOOTE GEAR WORKS

1309 South Cicero Avenue
Cicero 50, Illinois

New Booklet on Diesel Operation

LANOVA Corporation recently announced the publication of a new 58-page handbook-size booklet entitled *The Lanova Combustion System for Diesels.* This booklet gives an up-to-date description of the Lanova Combustion System, what it is, and how it functions. Included is such elementary material as is considered necessary to give the reader a clear understanding of the subject.

In presenting the subject of combustion the booklet illustrates and discusses the representative types of Diesel combustion systems. A useful appendix of engineering tables and data is also included. Written in non-technical language and profusely illustrated, this booklet provides a valuable manual on Diesel engine performance for engineers and non-engineers alike.

Copies are supplied on request by Lanova Corporation, 38-15 30th Street, Long Island City 1, New York.

2 1/4 Billion Dollars Needed for U. S. Highways

During the past twenty years much of the nation's highways have been converted from dusty wagon trails to smooth surfaced roads designed to accommodate America's business and recreational needs. But the job is far from complete. Already authorities are predicting automobile registrations in excess of 30,000,000 by 1951, with the likelihood of 50,000,000 during the next decade.

In view of this national dependency on highways, construction needs become more urgent with each passing day. New and improved units such as this powerful 11-ton Allis-Chalmers AD Motor Grader, will help considerably to enable contractors to keep pace with an unprecedented demand for more roads. The American Road Builders' Association recently announced that 100,000 miles of state and federal roads need replacement, 40,000 miles of new highways are needed immediately, 40,000 miles of interstate roads are necessary now. All of these post war needs will require, at a minimum, about $2,250,000,000.

Order Your Copy of the DIESEL ENGINE CATALOG now. Thoroughly revised—more complete—indispensable. Convenient order coupon on Page 81 this issue. Mail it today.

Motor Boat Show Jottings

THE DIESEL INDUSTRY predominated the ballroom floor exhibits at the recent Motor Boat Show in New York City's Grand Central Palace. The colorful engine exhibits attracted hundreds of interested boating enthusiasts . Cummins, Buda, Atlas, Nordberg and General Motors exhibits filled the Lexington Avenue side of the exhibit space. Working cutaway models of Diesels intrigued young and old alike. The brightly colored Diesels were eye-catching with the sea-blue Cummins, and the bronze Buda's and the traditional bright yellow of the Caterpillar Diesels all getting their share of attention. The largest Diesel exhibit was that of the General Motors Corporation which included the latest marine Diesel models of the Detroit and Cleveland Divisions. In size these Diesels ranged from the small 2-cylinder model featured by the Detroit Division to the 1200 hp. Cleveland Division Diesel, which dwarfed neighboring exhibits. The Lorimer Engine Company was represented at the show.

Other Diesels were shown on the second and third floors and included exhibits by the Gray Marine Motor Company, Hallett Manufacturing Company, Kermath Manufacturing Company, Lathrop Engine Company, D. W. Onan & Sons, Inc., Palmer Brothers Engines, Inc., R. H. Sheppard Co., U. S. Motors Corporation, and John Reiner & Company. Benjamin's For Motors represented the industry on the top floor.

Engine control manufacturers included Sperry Products, Inc., exhibiting the Exactor control while Adel Precision Products Corp. featured their Iso-draulic models. The E. J. Willis Company and Lucian Q. Moffitt, Inc., featured stern tube bearings. The G. Walter Machine Company demonstrated its keel cooling equipment as well as its recently developed space saving "vee" drive.

The American Bosch Corporation featured its new injection pump at its very interesting exhibit. Fram Corporation showed its complete line of Filcron filters. Sperry Gyroscope presented its Magnetic Compass Pilot.

"Regutron" Electronic Speed Control

FOR use in controlling speed of the E-M Magnetic Drive, the "Regutron"* provides excitation and speed control of boiler draft fans and centrifugal pumps, compressors and blowers on which the Magnetic Drive is used.

E-M speed regulator

"Regutron"* rectifies 3-phase supply current to energize Magnetic Drive, and adjusts value of current to hold operating speed of load to within plus or minus 1% of selected speed.

* T.M. Reg.

WEST COAST DIESEL NEWS

By FRED M. BURT

PURCHASE of another 20 powerful Diesel-electric freight locomotives and 20 more Diesel-electric switch engines, as announced by Southern Pacific's President A. T. Mercier, increases the number of Diesel-electric locomotives of various types owned by the Southern Pacific Transportation System to 230, making these postwar equipment orders reach a total of more than $152,000,000.

TWO 750 hp. supercharged Superior Diesels, each direct connected to 500 watt, 2400 volt generators, have just been supplied to Orkus Power & Light Co., East Sound, Wash., through the Los Angeles (Torrance) office of the National Supply Co., and the company's representative, Louis R. Shults in Portland, Ore.

A NEW 106 ft. wooden tuna clipper built by Peterson Boat Works, Tacoma, for Jimmy Hitchcock, San Diego, is powered with a Model 60M6, 450 hp. at 450 rpm., 12 in. x 15 in., Superior Diesel; two 60 kw. Buda Diesel generating sets for auxiliaries.

FISHING for Van Camp, San Pedro, John Gargas purse seiner *City of Los Angeles*, has received a new 45 kw. Caterpillar Diesel generating set, to supplement a similar auxiliary installed when the vessel was constructed, supplied by Shepherd Diesel Marine.

RAYMOND K. HANSEN, Sausalito, Calif., fisherman has had his combination boat *California State* re-powered with the first Graymarine 4 cyl. 35 hp. Diesel engine to be installed around San Francisco; purchased from Thompson Machine Wks., San Francisco, fitted with a Twin Disc reduction and reverse gear.

UNDER construction at Sagstad Shipyards, Ballard, Wash., for Evans Engine & Equipment Co., Seattle, distributors of General Motors Diesels, is a new 34 ft. x 10 ft. Diesel troller, to be equipped with a 55 hp. GM Diesel. Based on Architect Edwin Monk's designs, it will be displayed at the Marine Dealer's Boat Show in Seattle in February.

THE death of John W. Lorimer, 82, in Oakland, marks the passing of one of the few remaining American Diesel engine pioneers. He was one of the founders of the Atlas Imperial Engine Co., then (1903) the Atlas Gas Engine Co., San Francisco. In a new plant in Oakland, in 1915, they built what was thought to be the first all-American designed and built Diesel engine. Leaving Atlas in 1930, with son Ralph S, (now head of the company) and Chief Engineer Pete Bahr, he founded the Lorimer Diesel Engine Co., Oakland.

THE *Ono*, 143 ft. tug, powered with a 1,000 hp. General Motors Diesel, designed for Navy service but purchased just before completion and reconverted by Isleways, Ltd., for use in the Hawaiian Islands, completed an unusual 21 day tow from Honolulu to Oakland—towing three crewless, Ex-Navy destroyers for scrapping at the Moore Drydock Co.—the *Bagley*, towed at 600 ft., *Craven* at 1390 ft., *Helm* at 2200 ft.

INSTALLED in a new tug for River Lines, San Francisco by Thompson Machine Works, San Francisco, two 6 cyl., 9 in. x 12 in., 260 hp. at 600 rpm., Superior Diesel engines.

NYNA ROSE II, 68 ft. purse seiner, built by Pacific Boat Building Co., Tacoma, as an addition to the San Pedro fishing fleet, is powered with a Washington 180 hp., 6 cyl. direct reversing Diesel engine.

A 40% increase in the capacities of Diesel-powered clippers and seiners in the Southern California fishing fleets is credited with being the reason for an all-time high, season's tuna pack; the current season's catch being expected to reach about 5,000,000 cases.

ONE of the largest seiner-type fishing vessels ever built is the steel ship, 106 ft. x 26.8 ft. x 13 ft. which is the 100th hull launched by Tacoma Boatbuilding Co., powered with a 600 hp. Washington Diesel and with three General Motors auxiliary Diesels, two of which are 60 kw. electric generating sets, the third an 82 hp. torque converter.

THE 1948 Pacific Northwest Boat Show and Marine Exposition, to be held in Seattle, Feb. 21-29, is expected to have a second-to-none status among boat shows in the United States; 34,000 sq. ft in the huge Field Artillery Armory (with one of the largest unobstructed floor spaces under a single roof) will be devoted to displays of boats and allied marine equipment and accessories.

THE latest additions to the huge Pacific Freight Lines (Los Angeles) fleet, are ten International West Coast Freighters, powered with Cummins Diesels, supercharged to develop 200 hp.

UNDER construction at Long Beach is a 42 ft. fishing boat, by Chorpenning & Gustafson, to be powered with a D-4600 65 hp. Caterpillar Diesel, and with Western gear.

ADVERTISERS' INDEX

HUGHES PRINTING CO.
EAST STROUDSBURG, PA.